



## BUTTE COUNTY DISTRICT ATTORNEY

MICHAEL L. RAMSEY  
District Attorney

MARK MURPHY  
Chief Deputy District Attorney



JUAN DIAZ  
Chief Investigator

# THE CAMP FIRE PUBLIC REPORT

## A SUMMARY OF THE CAMP FIRE INVESTIGATION

June 16, 2020

"To do Justice, as no one is above the Law, nor beneath its protection"

25 County Center Drive • Suite 245 • Oroville, California 95965-3370

Tel: (530) 538-7411 • Fax: (530) 538-7071 • [www.buttecounty.net/da](http://www.buttecounty.net/da)

## **PREFACE**

During the early morning hours of Thursday, November 8, 2018, the Cal Fire Captain in charge of the Jarbo Gap station in the Feather River Canyon could hear the “Jarbo Winds” as they were known locally begin to howl as he got up to fix breakfast for his crew. As he fixed that breakfast he started to hear what he thought was rain begin to hit the roof and sides of the fire station. He started to look outside when the wind took the door from his hand. He discovered it wasn’t rain he was hearing, but pine needles from the surrounding forest forcibly pelting the outside of the station. He went back inside to continue fixing breakfast, but was interrupted as the station’s dispatch radio feed went off alerting him to a possible fire in the Canyon.

The Cal Fire crew immediately rolled out of the station up Highway 70 and the Canyon, past the small enclave of Pulga and up river to the Poe Dam. Arriving above PG&E’s Poe Dam just before sunrise, the Captain and crew saw the beginnings of a conflagration under the PG&E high voltage power line on the ridge top across the river from them. The sight sent a chill through the Captain and crew because they could see the fire was already exploding toward the south and west riding the Jarbo Winds, which were so high the Captain struggled to remain upright. The Captain radioed into his headquarters with urgency in his voice – his crew would never be able to get in front of this fire to control it and in a prophetic understatement he told dispatchers: “This has the potential of a major incident.”

In less than an hour, the fire had torn through Pulga and the mountain hamlet of Concow and reached the eastern outskirts of Paradise – throwing softball-sized embers ahead to the north into Magalia and over the town into the Butte Creek Canyon on the west side. Paradise and its residents were hit from three side by massive walls of fire. Chaos and confusion reigned. Thousands of homes and businesses were lost in the matter of a couple of hours. A town of some 26,000 people was utterly destroyed.

Eight-four souls were lost in the most horrific way imaginable – burned to death.

Within a few hours of the fire, Cal Fire arson investigators began to make their way to where the responding Captain had seen the start of the fire. Traveling up Camp Creek Road (from which the Camp Fire took its quirky name), the investigators came to what appeared to be the fire’s beginning. The ground under what was PG&E’s transmission tower #27/222 showed clear signs of the fire’s beginning and a burnt path toward the southwest. Looking up, the investigators saw a detached line hanging down into the steel superstructure of the high-voltage transmission tower.

Something had broken - and sent the live 115 kilovolt (kV) power line (also known as a conductor) to arc against the steel tower and shower molten steel and aluminum metal onto the grass and brush below. A painstakingly detailed arson investigation began.

Within a few hours, the Cal Fire investigators had begun to reach their preliminary conclusions that the Camp Fire was started by the failure of a suspension hook holding up an insulator string which in turn held up the highly energized line. The investigators had found the broken iron

hook, also known as a “C hook”, and it appeared to have not just broken, but had worn through after a great deal of time hanging in the windy environs of the Feather River Canyon.

The investigators reached out to the Butte County District Attorney’s Office on November 9, 2018 and discussed their initial findings with the office – including their concern that a PG&E helicopter had been seen hovering above the suspect tower.

The Butte County District Attorney’s Office had had past dealings with PG&E and its criminal violations of failing to clear vegetation from its lines which sparked fires. The office also knew PG&E was a federal felon for its criminal actions leading to the San Bruno gas line explosion.

A directive was given the Cal Fire arson investigators that the DA’s office was opening a joint investigation with them and to treat the fire origin site as a crime scene and to prevent anyone, including PG&E, from entering. (The Cal Fire investigators had already started the process of securing the scene with private security.)

And so began the Camp Fire Investigation. . .

The next week Cal Fire arson investigators directed PG&E linemen under their close scrutiny to begin the dismantling of tower 27/222 and seized relevant portions for evidence. Later, Butte County District Attorney investigators teamed with Cal Fire arson investigators to examine other power lines in the vicinity of the suspect tower. Evidence from those surrounding towers was seized with the assistance of experienced linemen from PG&E under the close scrutiny of a loaned Federal Bureau of Investigation (FBI) Evidence Team.

Prosecutors were taken from normal day-to-day business in the office and assigned to oversee the investigation. Thus began the arduous task of gathering information from PG&E and others to determine the who, what, how and why of the Camp Fire.

Early into the investigation it became clear that as we began to collect terabytes of data from a facially cooperative PG&E that more broad based and intrusive subpoenas would be needed to dig out data from the extensive PG&E files including its vendor files. Additionally as PG&E witnesses, past and present, were being contacted for interviews, we found PG&E has hired attorneys to represent them and encourage silence.

We partnered with the California Attorney General who assigned experienced prosecutors to assist in the investigation and it was decided a special investigative criminal grand jury should be sworn to subpoena evidence and examine reluctant witnesses under oath. This grand jury was in addition to the regular “watchdog grand jury” that is sworn in every June in Butte County. This special grand jury of 19 ordinary Butte County citizens was selected from 100 summoned potential jurors and sworn in on March 25, 2019.

As an investigatory grand jury, it was the duty of the jurors to sift through all the evidence, hear the witnesses and keep an open mind as to whether there truly was any criminal liability on the part of anyone for causing the Camp Fire. This dedicated group of citizens then meet in secrecy for the next year and heard nearly 100 witnesses, reviewed approximately 1600 exhibits, and produced some 6000 pages of transcript. It cannot be overemphasized the patience and sacrifice

of these citizens, meeting once to twice a week for almost a year. And since they were sworn to secrecy, they were not even able to tell their employers, friends and family what they were so diligently working on. Even more amazing was their dedication to their important work to seek justice. Such was their dedication that only three grand jurors were unable to finish their term.

The remaining 16, after their months of hard work and review of all matters, returned an Indictment finding sufficient evidence to charge the Pacific Gas and Electric Company with 85 felony counts – one count of unlawfully and recklessly causing the Camp Fire as a result of its gross negligence in maintaining its power line, and 84 individual counts of involuntary manslaughter naming each of the persons directly killed in the Camp Fire by PG&E's criminal negligence. The Indictment also included three special allegations for PG&E's causing great bodily injury to a firefighter; causing great bodily injury to more than one surviving victim; and causing multiple structures to burn (listed as approximately 18,804 structures). ([See attached Indictment.](#))

PG&E, who had been represented by criminal defense attorneys during the investigation and Grand Jury proceedings, was informed of the Indictment and decided to plead guilty “as charged” to all counts – thereby agreeing the evidence of its criminal negligence has been established beyond a reasonable doubt.

The following Camp Fire Public Report is a summary of the massive undertaking to determine if there was sufficient evidence to convict PG&E of its criminal behavior which lead to the Camp Fire and the awful destruction that followed. The Report also forms the core of legal documents filed with the Butte County Superior Court today to establish the Factual Basis for the pleas by PG&E to the Indictment and the People’s Statement in Aggravation for the sentencing of the defendant corporation.

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## **INTRODUCTION**

On November 8, 2018, a fire started underneath a PG&E transmission tower near Camp Creek Road, not far from the town of Pulga in Butte County, California. The fire quickly raged out of control, travelled to the town of Concow within an hour, and to Paradise – seven miles from the point of ignition – in less than 1.5 hours. Seventeen days later, on November 25, 2018, what had become known as the Camp Fire was finally declared 100% contained. It had burned 153,336 acres and destroyed approximately 18,800 structures.<sup>1</sup> Some 589 structures were damaged.<sup>2</sup> A total of 84 lives were lost as a direct result of the fire and at least two civilians and one firefighter suffered great bodily injury. {[Attachment – Camp Fire Presentation](#)}

### **I. INITIAL TIME LINE**

On November 8, 2018 at 6:15 a.m., the PG&E Grid Control Center (GCC)<sup>3</sup> in Vacaville documented an “interruption” on the energized Caribou-Palermo 115kV transmission line in the Feather River Canyon.

At approximately 6:20 a.m. on November 8, 2018, a PG&E Hydro Division employee<sup>4</sup> driving eastbound on Highway 70 observed a “bright light” above a ridgeline as he approached the Pulga Bridge. Initially the employee believed the bright light to be the sun rising behind the ridgeline; however, as he continued driving, he realized the source of the bright light was a fire underneath the PG&E transmission lines on a ridge on the north side of the Feather River. The employee noted the fire appeared to be at the base of a transmission tower. In that area of the Feather River Canyon cell phone service is not available. The employee used his PG&E radio to contact PG&E employees at the Rock Creek Powerhouse and reported the fire. These employees then called 911 and were transferred to the Cal Fire Emergency Communications Center (ECC) in Oroville. The 911 call from the Rock Creek Switching Station was received by Cal Fire ECC at 6:25:19 a.m.

At approximately 6:30 a.m., an employee of the California Department of Transportation (Cal Trans) arrived at the Cal Trans Pulga Station for work. While in the parking lot of the Pulga Station he observed a fire under a PG&E transmission tower northeast of the Pulga Station and took a photograph of it. The photograph {[Attachment 001](#)} showed a fire emanating out from

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<sup>1</sup>13,696 single family residences, 276 multi-family residences, 528 commercial structures, and 4,293 other structures were destroyed according to Cal Fire.

<sup>2</sup> 462 single family residences, 25 multi-family residences, and 102 commercial structures were damaged according to Cal Fire.

<sup>3</sup> The GCC is the consolidated hub for all transmission operations for PG&E. GCC monitors the Supervisor Control and Data Acquisition (SCADA) for all transmission lines at all times. Any problem on any PG&E transmission line triggers an immediate alert in the GCC.

<sup>4</sup> Throughout this report the names of local current/ former PG&E employees are not used. The Butte County District Attorney’s Office believes, based upon anger and frustration within the community, that disclosure of the identity of involved PG&E personnel living and/or working in the area may expose those personnel to harassment, threats or violence.

under transmission Tower :027/222<sup>5</sup> (Tower 27/222) of the Caribou-Palermo 115kV transmission line (Caribou-Palermo line).

At 6:29:55 a.m., the initial Cal Fire notification went out to Captain Matt McKenzie at the Concow/Jarbo Gap Station. By 6:35 a.m., two Cal Fire engines from the Concow/Jarbo Gap Station were on Highway 70 headed eastbound toward Pulga. Captain McKenzie and his firefighters first observed the fire just before reaching the Pulga Bridge. The two engines continued on Highway 70 to the Poe Dam to assess the fire and formulate a plan of attack. From above the Poe Dam on the south side of the Feather River, at 6:44 a.m., Captain McKenzie observed that the fire was burning under the electric transmission lines on the ridge on the north side of the Feather River. Based upon the location of the fire {[Google Earth map of 27/222 area and Pulga.](#)} as well as the high wind speed and direction, Captain McKenzie concluded there was no available route to attack the fire. Captain McKenzie immediately realized that the community of Pulga was in danger and dispatched his second engine to evacuate the residents of that community. From his position on Highway 70, Captain McKenzie took measure of the fire (and a photograph {[Attachment 002](#)}) and requested additional resources be deployed to the west to stop the fire at Concow Road. During his initial report to the ECC, based upon his observations of the fire, the topography, and the wind, Captain McKenzie warned, “this has the potential of a major incident.” (An hour later, at 7:44 a.m., the fire reached the Town of Paradise, a distance of approximately seven miles.)

At approximately 6:38 a.m., PG&E employees at the Rock Creek Powerhouse informed the GCC of the fire burning near the Poe Dam in the vicinity of the transmission lines. At approximately 6:40 a.m., the GCC notified the Transmission Line Supervisor for the Table Mountain District<sup>6</sup> of the fire. The Transmission Line Supervisor dispatched a troubleman to immediately perform an emergency air patrol of the Caribou-Palermo line. The troubleman located and documented damage on Caribou-Palermo line Tower 27/222 at 12:00 p.m. on November 8, 2018.<sup>7</sup>

At approximately 6:48 a.m. fire watch cameras on Flea Mountain and Bloomer Hill {[Attachment – Google Earth map](#)} recorded a plume of smoke east of Concow and west of Pulga. {[Fire](#)

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<sup>5</sup> According to PG&E naming convention, a transmission line name is based upon the starting point and ending point of the line. The Caribou-Palermo line starts at the Caribou Powerhouse and ends at the Palermo substation. Tower numbers are determined by the distance from the start of the line in miles and the sequential number of towers. The Caribou-Palermo line is divided into two segments; Caribou-Big Bend and Palermo-Big Bend. The inclusion of a colon (:) before the tower number denotes the Caribou-Big Bend segment. On the Caribou-Big Bend segment the tower numbering starts at the first tower coming out of the Caribou Powerhouse (:000/001) and ends with the last tower before the Big Bend Substation (:037/303). Tower 27/222 is located in the 27<sup>th</sup> mile away from the Caribou Powerhouse and is the 222<sup>nd</sup> structure in the line. On the Palermo-Big Bend segment the tower numbers begin with the last tower before the Palermo Substation (000/001) and ends with the first tower after the Big Bend Substation (016/130). {[Attachment – Google Earth Map of C-P](#)}

<sup>6</sup> PG&E’s electrical transmission grid is divided into geographic districts. Each district is supervised by a Transmission Line Supervisor. The transmission lines in the Feather River Canyon are within the Table Mountain District.

<sup>7</sup> At 12:01 p.m. a Cal Fire investigator spotted and photographed a helicopter from a local charter helicopter firm hovering above tower 27/222. Based upon the tail number of the helicopter it was confirmed this was the helicopter performing the emergency inspection of the Caribou-Palermo line.

Watch Camera Bloomer, Fire Watch Camera Flea} Cal Fire monitors initially attributed the plume of smoke to the Camp Fire. Later Cal Fire monitors and investigators determined the smoke plume was not associated with the Camp Fire and was caused by a separate and unrelated fire. Utilizing mapping tools Cal Fire investigators determined the plume of smoke had arisen from an area near the intersection of Concow Road and Rim Road in eastern Concow. The fire was named the Camp B Fire.

## **II. ORIGIN AND CAUSE INVESTIGATIONS**

Cal Fire assigned a team of highly trained and experienced “Origin and Cause” investigators from around California to assist the local Butte Unit investigators. Cal Fire also retained and assigned subject matter experts to assist with the investigation. The investigators were divided into two teams. One team was assigned to investigate the Camp Fire. The second team was assigned to investigate the Camp B Fire.

Cal Fire investigators determined the origin of the Camp Fire was the dry brush below Tower 27/222 of the Caribou-Palermo line, an electrical transmission line owned and operated by PG&E. Tower 27/222 was determined to be a “Transposition” tower<sup>8</sup> {[Attachment – Krelle 3D model](#)}. With the assistance of a licensed electrical engineer, Cal Fire investigators determined the cause of the Camp Fire was electrical arcing between an energized “jumper” conductor (power line) and the steel tower structure. {[Attachment - Framework of transposition tower](#)} Investigators determined a “C hook” that linked an insulator string connected to the jumper conductor to the transposition arm of the tower failed, allowing the energized jumper conductor to make contact with the steel tower structure. {[Attachment 004](#)} The ensuing electrical arcing between the jumper conductor and steel tower structure caused the aluminum strands of the conductor to melt as well as a portion of the steel tower structure.<sup>9</sup> The molten aluminum and steel fell to the brush covered ground at the base of the steel tower structure. {[Attachment 005](#)} This molten metal ignited the dry brush.

Cal Fire investigators determined the Camp B Fire originated to the west of Concow Road south of the intersection of Concow Road and Rim Road in a geographical bowl. The area of origin was under the right of way of the Big Bend 1101 12kV distribution line. The area of origin was approximately 2.6 miles west of the origin of the Camp Fire. At the area of origin investigators located a broken conductor from the Big Bend 1101 12kV distribution line and a fallen Ponderosa pine tree. Burn patterns on the Ponderosa pine indicated the tree had contacted a live electrical line. {[Attachment 006](#)} PG&E records show a documented outage on the Big Bend 1101 12kV circuit at 6:45 a.m. on November 8, 2018. Investigators determined the Camp B Fire was ignited when the Ponderosa pine tree toppled over onto and broke the energized Big Bend 1101 12kV distribution line. The Ponderosa pine and its stump were examined and analyzed by a certified arborist<sup>10</sup> retained by Cal Fire. The arborist determined that the Ponderosa pine was

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<sup>8</sup> A transposition tower is a transmission tower that changes the relative positions of the conductors (power lines) to each other to maintain electrical balance. Transposition towers are placed at intervals along the transmission line.

<sup>9</sup> Aluminum melts at approximately 1200 degrees Fahrenheit, steel melts at approximately 2700 degrees Fahrenheit. The electrical engineer estimated the temperature of the electrical arc between the conductor and the steel structure between 5,000 and 10,000 degrees Fahrenheit.

<sup>10</sup> International Society of Arboriculture Board Certified Master Arborist.

diseased and dying prior to November 8, 2018.<sup>11</sup> However, the arborist determined the disease was internal and likely would not have been visible to PG&E tree inspectors during their vegetation management inspections. According to the arborist the disease likely only would have been discoverable by an advanced inspection.<sup>12</sup>

Before the Camp B Fire grew large enough to escape its geographical bowl, it was passed over and consumed by the Camp Fire. Based upon fire indicators and patterns within the Camp B Fire and recordings from the fire watch cameras, Cal Fire investigators determined that the Camp B Fire had little, or no, effect on the Camp Fire.

### **III. INJURIES AND LOST LIVES**

In support of the great bodily injury enhancements, evidence was presented of two civilians and one fire fighter who were severely burned during the Camp Fire.

Victim 1, an adult female, was located in Concow by a Cal Fire crew in the area trying to locate another reportedly trapped victim. As the engine was trying to leave the area, visibility was near or at zero, when suddenly the smoke cleared briefly. In that moment, the Captain of the fire crew saw an arm appear from between two vehicles. The Captain and his crew stopped and located the badly burned female victim. Lying beside the female victim was a deceased male. The deceased male was later identified as the female victim's roommate. The Captain described how he and his crew repeatedly checked the male roommate futilely hoping to find signs of life. The Cal Fire crew rescued the female victim. According to the Captain, when Victim 1 was lifted into the engine, her skin sloughed off due to the severity of her severe burns. She was taken to a medical evacuation area for transport to a hospital.

Victim 2, an adult female, was located in Paradise with her husband. Victim 2 and her husband had been trying to flee the fire but were overtaken. Victim 2 and her husband took shelter behind a boulder but both were severely burned. Victim 2 and her husband were rescued by Cal Fire and taken to a medical evacuation area for transport to a hospital. According to the Cal Fire Captain, who supervised that rescue and evacuation, Victim 2 also had skin sloughing off as she was taken from an engine and placed into an ambulance. Both Victim 2 and her husband were transported to the UC Davis Medical Center Burn Unit. Victim 2's husband ultimately succumbed to his burn injuries.

Victim 3, an adult male, was a Cal Fire Captain. The Captain described that as he and his crew were preparing to do a back fire operation to create a fire break east of Clark Road and south of Rattlesnake Flats Road, northeast of Butte College, the fire changed direction and, fueled by high winds, "exploded." As the fire came rushing towards them, the Captain held strands of barbed wire up to allow his crew to quickly escape into the safety of a clearing. After his crew was safely through the fence, the Captain attempted to go through the fence. As he was going

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<sup>11</sup> The arborist also consulted with a professor of Dendrochronology at the Indiana State University Dendro Lab.

<sup>12</sup> An advanced inspection would entail use of diagnostic tools such as a mallet, a resistograph or a sonic tomogram and generally only occurs when anomalies or outward signs of disease or decay are observed during the visual inspection.

through the fence the Captain's gear caught on the barbed wire. As a result, the fire overran his position and the Captain was severely burned. The Captain was medically evacuated to UC Davis Medical Center Burn Unit. All members of his crew survived with only minor injuries.

The Camp Fire also directly<sup>13</sup> caused the deaths of the following 84 persons: {[Attachment – Camp Fire Victim Locations download and open with Google Earth Pro](#)}

**Joyce Acheson** – Ms. Acheson, who was 78 years old, was found deceased in her home at 1250 Elliot Road, Unit 17, in the Town of Paradise. Ms. Acheson was of limited mobility, and lived in an area that was closed off to public access, thereby preventing any caregiver from getting to her.

**Herbert Alderman** – Mr. Alderman was 80 years old and was found deceased inside his home at 5775 Deanna Way in the Town of Paradise. A severely sprained ankle prevented his mobility at the time of the fire, and he made several phone calls to friends seeking rescue before he perished.

**Teresa Ammons** – Ms. Ammons was 82 years old. She was found deceased outside her home at 6674 Pentz Road, Unit 112, in the Town of Paradise. The evidence indicated Ms. Ammons died while attempting to flee the fire as she was found just outside her trailer with her purse nearby.

**Rafaela Andrade** – Ms. Andrade was 84 years old and was found deceased inside her home at 6664 Moore Road in the Town of Paradise. She could not walk without the assistance of a walker, and did not have the ability to evacuate on her own.

**Carol Arrington** – Ms. Arrington was 88 years old. Ms. Arrington was found deceased inside her home at 1866 Stark Lane in the Town of Paradise.

**Julian Binstock** – Mr. Binstock was 88 years old. The remains of Mr. Binstock and his dog were located in the shower of his residence at 5900 Canyon View Drive in the Town of Paradise.

**David Bradbury** – Mr. Bradbury was 70 years old. Mr. Bradbury was found near 6028 Dubarry Lane, in the Town of Paradise. Mr. Bradbury was found within 400 feet of his residence on Pentz Road, near a power line knocked down by the fire. Based upon the evidence, Mr. Bradbury was fleeing the fire when he died.

**Cheryl Brown** – Ms. Brown was 75 years old. Ms. Brown was found deceased in her home at 1387 N-B Lane in the Town of Paradise. Ms. Brown was found seated in a recliner next to her husband, Larry Brown.

**Larry Brown** – Mr. Brown was 72 years old. Mr. Brown was found deceased in his home at 1387 N-B Lane in the Town of Paradise. Mr. Brown was found seated in a recliner next to his wife, Cheryl Brown.

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<sup>13</sup> Only persons who died within the Camp Fire footprint on November 8, 2018 from fire-related injuries; or who were medically evacuated from within the Camp Fire footprint on November 8, 2018 to medical facilities and subsequently died as a result of fire-related injuries were counted as direct victims.

**Richard Brown** – Mr. Brown was 74 years old. Mr. Brown was found deceased under his pickup truck outside his residence at 13377 Eleran Lane in the community of Concow. Based upon the physical evidence, Mr. Brown tried to hide from the fire under his truck.

**Andrew Burt** – Mr. Burt was 36 years old. Mr. Burt was found deceased just outside of the front passenger side door of a minivan. The minivan was located facing north in the 5000 Block of Edgewood Road, approximately .3 miles south of Mr. Burt's residence at 5236 Edgewood Lane in the Town of Paradise. The remains of Mr. Burt's dog were found next to Mr. Burt. Based upon the evidence, Mr. Burt had been in the minivan attempting to escape the fire when the minivan was overcome by the fire. There were three other vehicles containing the remains of four other victims near the minivan.

**Joanne Caddy** – Ms. Caddy was 75 years old. Ms. Caddy was found deceased inside her home at 13812 West Park Drive in the community of Magalia.

**Barbara Carlson** – Ms. Carlson was 71 years old. Ms. Carlson was found deceased in her residence at 5577 Heavenly Place in the Town of Paradise. Ms. Carlson's remains were comingled with those of her sister, Shirley Haley.

**Vincent Carota** – Mr. Carota was 65 years old and found deceased inside his residence at 5471 South Libby Road in the Town of Paradise. Mr. Carota was a partial leg amputee without a vehicle.

**Dennis Clark, Jr.** – Mr. Clark was 49 years old. Mr. Clark was found deceased in the passenger seat of a car with his mother Joy Porter deceased in the driver's seat. Their vehicle was in a line of three other vehicles found facing north in the 5000 block of Edgewood Lane in the Town of Paradise. The vehicle was located approximately .3 miles south of Mr. Clark and Ms. Porter's residence on Sunny Acres Road, off of Edgewood Lane.

**Evelyn Cline** – Ms. Cline was 81 years old. Ms. Cline was found deceased in her residence at 578 Roberts Drive in the Town of Paradise. She was physically immobile and unable to leave her home without assistance.

**John Digby** – Mr. Digby was 78 years old and found deceased inside his residence at 6920 Clark Road, Unit #3, in the Town of Paradise.

**Gordon Dise** – Mr. Dise was 66 years old and was found deceased inside his home at 2735 Eskin Maidu Trail in Chico (Butte Creek Canyon.). According to his daughter, who fled the house with her father, he went back in their home for something and never made it back out.

**Paula Dodge** – Ms. Dodge was 70 years old. Ms. Dodge was found deceased between two cars in the carport of her residence at 5152 Pentz Road in the Town of Paradise. Ms. Dodge's husband, Randall Dodge, was found deceased next to her. Based upon the evidence, Mr. and Ms. Dodge were attempting to flee the fire.

**Randall Dodge** – Mr. Dodge was 66 years old. Mr. Dodge was found deceased between two cars in the driveway of his residence at 5152 Pentz Road in the Town of Paradise. Mr. Dodge's

wife, Paula Dodge, was found deceased next to him. Based upon the evidence, Mr. and Ms. Dodge were attempting to flee the fire.

**Andrew Downer** – Mr. Downer was 54 years old. Mr. Downer was found deceased outside the front door of his residence at 8030 Skyway, Unit A, in the Town of Paradise. Based upon the evidence, it appears Mr. Downer died while attempting to flee the fire. He was a wheelchair bound amputee and was unable to drive.

**Robert Duvall** – Mr. Duvall was 76 years old. Mr. Duvall was found deceased in the passenger seat of his truck. No one else was located in the truck. The truck was in a line of three vehicles found facing north in the 5000 block of Edgewood Lane in the Town of Paradise. The vehicle was located approximately .3 mile north of Mr. Duvall's residence on Sunny Acres Road, off of Edgewood Lane. A second vehicle registered to Mr. Duvall and containing the remains of Mr. Duvall's girlfriend, Beverly Powers, was located nearby.

**Paul Ernest** – Mr. Ernest was 72 years old. Mr. Ernest and his wife attempted to escape the fire by driving quads<sup>14</sup> off road through a canyon. When their escape route was blocked by a rock formation, Mr. Ernest and his wife were overtaken by the fire. Both were severely burned, and airlifted to UC Davis Medical Center Burn Unit in Sacramento. Mr. Ernest passed away from his injuries on August 5, 2019, nearly 9 months after the fire. He never left the extended care medical facility in Sacramento, after being transferred there from the UC Davis Burn Unit.

**Rose Farrell** – Ms. Farrell was 99 years old. Ms. Farrell was found deceased on the front porch of her residence at 1378 Herman Way in the Town of Paradise. Her wheelchair was found near Ms. Farrell.

**Jesus Fernandez** – Mr. Fernandez was 48 years old. Mr. Fernandez was found on the ground between two vehicles on Broken Glass Circle near Vista Ridge Road in Concow. Mr. Fernandez was the roommate of burn Victim 1 (above). Victim 1 believed Mr. Fernandez died shortly before her rescue.

**Jean Forsman** – Ms. Forsman was 83 years old and found deceased inside her residence at 13747 Andover Drive in the community of Magalia.

**Ernest Foss, Jr.** – Mr. Foss was 63 years old. Mr. Foss was found deceased outside of his residence at 5236 Edgewood Lane in the Town of Paradise. Mr. Foss was found with his oxygen tank. The evidence indicates Mr. Foss, who had limited mobility, was attempting to flee the fire at the time of his death.

**Elizabeth Gaal** – Ms. Gaal was 80 years old and found deceased inside her residence at 5393 Sawmill Road, Unit # 27 in the Town of Paradise.

**Sally Gamboa** – Ms. Gamboa was 69 years old. Ms. Gamboa was located deceased in a field/clearing behind her residence at 1560 Sunny Acres Road in the Town of Paradise. Based upon the evidence, Ms. Gamboa died while attempting to flee the oncoming flames.

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<sup>14</sup> All terrain sport utility vehicles

**James Garner** – Mr. Garner was 63 years old. Mr. Garner was found deceased inside his residence at 6284 Woodbury Drive in the community of Magalia. Earlier on the morning of November 8, 2018, Mr. Garner had engaged in multiple telephone calls with his sister and nephew.

**Richard Garrett** – Mr. Garrett was 58 years old. Mr. Garrett was found deceased among trees not far from a residence at 4238 Schwyhart Lane in the community of Concow. Based upon the physical evidence Mr. Garrett was actively running from the fire when he was overtaken and killed by the flames.

**William Godbout** – Mr. Godbout was 79 years old and found deceased inside his residence at 3831 Camelot Lane in the community of Concow.

**Shirley Haley** – Ms. Haley was 67 years old. Ms. Haley was found deceased at 5577 Heavenly Place in the Town of Paradise. Ms. Haley's remains were found comingled with the remains of her sister, Barbara Carlson.

**Dennis Hanko** – Mr. Hanko was 56 years old and found deceased inside his residence at 5081 Wilderness Way, Unit 3A, in the Town of Paradise.

**Anna Hastings** – Ms. Hastings was 67 years old. Ms. Hastings was found deceased in her residence at 8391 Montna Drive in the Town of Paradise. She was disabled, with severe scoliosis, and unable to drive.

**Jennifer Hayes** – Ms. Hayes was 53 years old. Ms. Hayes was found deceased in her residence at 5683 Scotty Lake Drive, in the Town of Paradise.

**Christina Heffern, Ishka Heffern and Matilde Heffern** – Christina Heffern was 40 years old. Ishka Heffern, the daughter of Christina, was 20 years old. Matilde Heffern, the mother of Christina Heffern, was 68 years old. All three were located in their residence at 1865 Norwood Drive in the Town of Paradise. Their remains were located commingled in the bathtub of their residence. The Hefferns placed a 911 call as the fire approached their home. Somehow the phone line remained open as the house, and the three women, burned as helpless Cal Fire ECC dispatchers listened to their screams.

**Louis Herrera** – Mr. Herrera was 86 years old and found deceased inside of his home at 2376 Clearview Drive in the Town of Paradise. The remains of Mr. Herrera's wife, Dorothy Lee-Herrera, were also found in the residence.

**Evva Holt** – Ms. Holt was 85 years old and was found deceased in a burned vehicle near the intersection of Pearson Road and Stearns Road in the Town of Paradise, approximately 1.8 miles from Ms. Holt's residence.

**TK Huff** – Mr. Huff was 71 years old. Mr. Huff was located deceased outside of his residence at 13471 Green Forest Lane in the community of Concow. Mr. Huff only had one leg and generally used a wheelchair. Mr. Huff's wheelchair was found approximately 10 feet away from Mr. Huff. The physical evidence indicated Mr. Huff tried to escape the flames by dragging himself along the ground.

**Gary Hunter** – Mr. Hunter was 67 years old. Mr. Hunter was located deceased inside of his residence at 13554 Andover Drive in the community of Magalia. He had limited mobility, due to a stroke, and could not walk without assistance.

**James Kinner** – Mr. Kinner was 83 years old. Mr. Kinner was located deceased inside his residence at 5237 Black Olive Drive in the Town of Paradise.

**Dorothy Lee-Herrera** – Ms. Lee-Herrera was 93 years old. Ms. Lee-Herrera was found deceased in her residence at 2376 Clearview Drive in the Town of Paradise. The remains of Ms. Lee-Herrera's husband, Louis Herrera, were also found in the residence.

**Warren Lessard** – Mr. Lessard was 68 years old. Mr. Lessard was found deceased on the front porch of his residence at Athens Way and South Park Drive in the community of Magalia.

**Dorothy Mack** – Ms. Mack was 88 years old and found deceased inside her residence at 6674 Pentz Road, Unit 19, in the Town of Paradise.

**Sara Magnuson** – Ms. Magnuson was 75 years old. Ms. Magnuson was found deceased inside her residence at 1812 Drendel Circle in the Town of Paradise. Based upon the physical evidence it appears Ms. Magnuson wrapped herself in a wet carpet and sheltered in the bathtub in an attempt to save herself.

**Dolores Joanne Malarkey** – Ms. Malarkey was 90 years old. Ms. Malarkey was found deceased in her residence at 432 Plantation Drive in the Town of Paradise. The remains of Ms. Malarkey's husband, John Malarkey, were also found in the residence.

**John Malarkey** – Mr. Malarkey was 89 years old and was found deceased in his residence at 432 Plantation Drive in the Town of Paradise. The remains of Mr. Malarkey's wife, Joanne Malarkey, were also found in the residence.

**Christopher Maltby** – Mr. Maltby was 69 years old. Mr. Maltby was found deceased in his residence at 1040 Buschmann Road in the Town of Paradise.

**David Marbury** – Mr. Marbury was 66 years old. Mr. Marbury was found deceased inside his residence at 1481 Sun Manor, Unit A, in the Town of Paradise.

**Deborah Morningstar** – Ms. Morningstar was 65 years old and found deceased inside of her residence at 5848 Black Olive Drive, Unit 3, in the Town of Paradise. She was unable to drive, which prevented her from being able to flee.

**Helen Pace** – Ms. Pace was 84 years old. Ms. Pace was found deceased inside her residence at 6674 Pentz Road in the Town of Paradise. She had medical issues, which limited her ability to leave her home.

**Joy Porter** – Ms. Porter was 72 years old. Ms. Porter was found deceased in the driver's seat of her car with her son, Dennis Clark Jr., in the passenger seat. Their vehicle was in a line of three other vehicles found facing north in the 5000 block of Edgewood Lane in the Town of Paradise. The vehicle was located approximately .3 miles south of Mr. Clark and Ms. Porter's residence on Sunny Acres Road, off of Edgewood Lane.

**Beverly Powers** – Ms. Powers was 64 years old. Ms. Powers was found deceased in the driver's seat of a pickup truck registered to her boyfriend, Robert Duvall. The vehicle was in a line of three other vehicles found facing north in the 5000 block of Edgewood Lane, approximately .3 miles south of Mr. Duvall and Ms. Powers residence on Sunny Acres Road. One of the other two vehicles contained the remains of Mr. Duvall.

**Robert Quinn** – Mr. Quinn was 74 years old and found deceased in his residence at 5684 Clara Lane in the Town of Paradise.

**Joseph Rabetoy** – Mr. Rabetoy was 39 years old and found deceased in his residence at 5580 Angel Drive in the Town of Paradise. He had no means of escape as he didn't have a vehicle.

**Forrest Rea** - Mr. Rea was 89 years old and found deceased in his residence at 1909 Dean Road in the Town of Paradise.

**Vernice Regan** – Ms. Regan was 95 years old. Ms. Regan was found deceased outside of her home at 102 Magnolia Drive in the Town of Paradise.

**Ethel Riggs** – Ms. Riggs was 96 years old. Ms. Riggs was located deceased inside of her residence at 220 Berry Creek Drive in the Town of Paradise. Ms. Riggs spoke with her grandson via phone at least twice on the day of the fire and told him because the power was out she was unable to get her car out of the garage. Ms. Riggs told the grandson she could not reach the manual release for the garage door, and even if she could, she was not strong enough to raise the door.

**Lolene Rios** – Ms. Rios was 56 years old. Ms. Rios was found deceased in the basement of her home at 750 Meyers Lane in the Town of Paradise, along with the remains of her four dogs and two cats.

**Gerald Rodrigues** – Mr. Rodrigues was 74 years old and found deceased inside of his residence at 5436 Clark Road, Unit 14, in the Town of Paradise.

**Frederick Salazar, Jr.** – Mr. Salazar was 76 years old. Mr. Salazar was found deceased in his residence at 5303 Sawmill Road in the Town of Paradise. The remains of Mr. Salazar's wife, Phyllis Salazar, were also found in the residence.

**Phyllis Salazar** – Ms. Salazar was 72 years old. Ms. Salazar was found deceased in her residence at 5303 Sawmill Road in the Town of Paradise. The remains of Ms. Salazar's husband, Frederick Salazar, Jr., were also found in the residence.

**Sheila Santos** – Ms. Santos was 64 years old and found deceased in her home at 5471 S. Libby Road, Unit 34, in the Town of Paradise.

**Ronald Schenk** – Mr. Schenk was 74 years old. Mr. Schenk was found deceased in his home at 5471 S. Libby Road, Unit 33, in the Town of Paradise.

**Berniece Schmidt** – Ms. Schmidt was 93 years old. Ms. Schmidt was found deceased inside of her residence at 14175 Citadel Way in the community of Magalia with the remains of her cat and a kitten.

**John Sedwick** – Mr. Sedwick was 82 years old. Mr. Sedwick was found deceased on the front porch of his residence at 13816 Glover Lane in the community of Magalia.

**Don Shores** - Mr. Shores was 70 years old. Mr. Shores was found deceased in a recliner in his residence at 6778 Ishi Drive in the community of Magalia. The remains of Mr. Shores' wife, Kathy Shores, were found in an adjacent recliner. Also located with Mr. and Ms. Shores were the remains of two dogs and two cats.

**Kathy Shores** – Ms. Shores was 65 years old. Ms. Shores was found deceased seated in a recliner in her residence at 6778 Ishi Drive in the community of Magalia. The remains of Ms. Shores' husband, Don Shores, were found in an adjacent recliner. Also located with Mr. and Ms. Shores were the remains of two dogs and two cats.

**Judith Sipher** – Ms. Sipher was 68 years old. Ms. Sipher was found deceased in her residence at 1005 Village Parkway in the Town of Paradise.

**Larry Smith** – Mr. Smith was found severely burned in the driveway of his home at 6428 Rocky Lane in the Town of Paradise. Mr. Smith was rescued and transported to the UC Davis Medical Burn Center. Mr. Smith succumbed to his injuries while still in the hospital 17 days later. Mr. Smith was 80 years old.

**Russell Stewart** – Mr. Stewart was 63 years old and found deceased inside of his home at 6884 Pentz Road in the Town of Paradise.

**Victoria Taft** – Ms. Taft was 67 years old and found deceased inside of her home at 5883 Copeland Road in the Town of Paradise.

**Shirlee Teays** - Ms. Teays was 90 years old. Ms. Teays was found deceased inside of her residence at 9289 Skyway Road, Unit 15, in the Town of Paradise. She appears to have been holding or hugging a framed photograph.

**Joan Tracy** – Ms. Tracy was 82 years old. Ms. Tracy was found deceased inside of her home at 5326 Sawmill Road in the Town of Paradise.

**Unknown** – The remains of this unknown victim were found comingled with the remains of another victim in Concow. Attempts at identification are still being made.

**Ellen Walker** – Ms. Walker was 72 years old and found deceased inside of her home at 4220 Schwyhart Lane in the community of Concow.

**Donna Ware** – Ms. Ware was 86 years old and found deceased inside her home at 5783 Waco Lane in the Town of Paradise.

**Isabel Webb** – Ms. Webb was 68 years old. Ms. Webb was found deceased inside her home at 1449 Sleepy Hollow Lane in the Town of Paradise.

**Marie Wehe** – Ms. Wehe was 78 years old. Ms. Wehe was found deceased inside a burned truck on the side of Windermere Lane in the community of Concow approximately .3 mile east of Ms. Wehe's residence on Windermere Lane.

**Kimber Wehr** – Ms. Wehr was 53 years old and found deceased inside her residence at 5908 Del Mar Avenue in the Town of Paradise. She was unable to drive due to a neurological disability, and was unable to flee the fire on her own.

**David Young** – Mr. Young was 69 years old. Mr. Young was found deceased with two unidentified animals inside his mini-van. The mini-van was found crashed into a tree near the intersection of Hoffman Road and Jordan Hill Road in the community of Concow. The vehicle was located approximately 1.5 miles west of Mr. Young’s residence on Hog Ranch Road in the community of Concow. Based upon the evidence, Mr. Young crashed while fleeing the oncoming fire. Mr. Young and the two animals were found in the cargo area of the mini-van. The autopsy determined Mr. Young survived the crash, but was killed by the fire.

#### **IV. BACKGROUND OF THE FAILED COMPONENT**

##### **a. History of the Caribou-Palermo 115kV Transmission Line**

According to historical reports<sup>15</sup> provided by PG&E, the section of the Caribou-Palermo line that runs in the Feather River Canyon from the Caribou Powerhouse to the Big Bend Substation, was built between 1919 and 1921 by the Great Western Power Company. What is now known as the Caribou-Palermo line was originally part of a 165kV transmission line that carried electricity from the Caribou Powerhouse to the Valona Substation in Contra Costa County.<sup>16</sup> PG&E acquired the Caribou Powerhouse and the entire Caribou-Valona 165kV transmission line (Caribou-Valona line) when it purchased Great Western Power Company in 1930. According to the reports, sometime during the 1960s the Caribou-Palermo line was converted to 115kV. According to the reports, there were eleven segments<sup>17</sup>, including the Caribou-Big Bend segment, of the original Caribou-Valona transmission line still in service in 2018.

Despite the fact that PG&E has owned the Caribou-Big Bend portion of the Caribou-Palermo line since 1930, the evidence established PG&E did not catalogue or replace the original

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<sup>15</sup> In April 2017 cultural resources specialists from PG&E produced a document entitled “National Register of Historic Places Inventory and Evaluation of Eleven Transmission Lines Associated with the Historic Alignment of the Caribou-Valona Transmission Corridor (NRHP Inventory and Evaluation). The NRHP Inventory and Evaluation was updated in October, 2018 by Cardno Inc. The NRHP Inventory and Evaluation includes a 2018 report entitled “DPR 523 Form” produced by the California Department of Parks and Recreation (DPR Report).

<sup>16</sup> Using a current map, the original Caribou-Valona line ran parallel to the Feather River from Caribou-Road through the Feather River Canyon, passing to the east of Oroville to Palermo. South of Palermo the line ran parallel to State Route 70 thru Sacramento. From south of Sacramento the line ran parallel to Interstate 80 to Vallejo. The line crossed the bay from Vallejo to Valona parallel to the current Carquinez Bridge on Interstate 80. The total length of the line was 1368 steel towers and 186 miles.

<sup>17</sup> As the electrical transmission grid has grown and substations were added the original Caribou-Valona line was divided into segments (sometimes referred to as circuits in PG&E historical documents) corresponding to the substations. The eleven segments still in use in 2018 were the Caribou-Palermo line, Paradise-Table Mountain, Palermo Pease, Pease-Rio Oso, Rio Oso-West Sacramento, Brighton-Davis, Brighton-Davis (idle), Vaca-Suisun-Jamison, Ignacio-Mare Island #1, Oleum-G #1 and Oleum-G #2.

conductors,<sup>18</sup> insulators or attachment hardware<sup>19</sup> on many of the towers in the original Caribou-Big Bend section of the transmission line.

Many components on Tower 27/222 were identified by PG&E as original Great Western Power components because they matched components included in the original Great Western Power Company schematic drawings for construction of the transmission line. Among those components were the insulators hung from C hooks<sup>20</sup>. The records provided by PG&E clearly established the insulator string hanging from the C hook that broke on November 8, 2018 was an original 1921 insulator. Other components, such as the C hooks and the conductor, either did not completely match the original records<sup>21</sup> or PG&E did not possess original records.<sup>22</sup>

Evidence established that, with the exception of add-on hanger brackets which were added to the ends of the transposition arms to replace worn hanger holes, the transposition components on Tower 27/222, including the transposition arms, C hooks, insulator strings and jumper conductor, were original components in service since 1921. The evidence further established that despite owning Tower 27/222 since 1930, PG&E had little or no information about the 97-year-old conductor and the hooks, original hanger holes and bolted-on hanger hole plates supporting that conductor.

#### **b. C Hook and Hanger Hole Wear**

The broken C hook{[Attachment 7](#)} and the transposition arm {[Attachment 8](#)}on which it had been hung were collected as evidence by Cal Fire investigators<sup>23</sup>. The transposition arm was identified as the left “phase” arm of Tower 27/222 {[Attachment – 3D model w/ left phase highlighted](#)}. This left phase arm had a bolted-on hanger hole plate which showed substantial wear where the broken hook had hung.

Cal Fire investigators also collected as evidence the right phase transposition arm and its still-connected (hung) C hook from Tower 27/222. .{[Attachment 9](#)} While examining the right phase C hook, Cal Fire investigators observed a “channel” had been worn into that hook where it hung from the bolted-on hanger plate hole of that transposition arm. {[Attachment 10](#)} The wear channel was similar to the channel cut into the broken left phase C hook. Similarly the right

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<sup>18</sup> In layman’s terms, a “conductor” is known as a power line or wire.

<sup>19</sup> Hot end attachment hardware attaches the insulators to the conductor. Cold end attachment hardware attaches the insulators to the tower/structure/pole. {[Attachment – illustrative photo](#)}

<sup>20</sup> Also known as “Suspension hooks.” C hooks are part of the cold end attachment hardware.

<sup>21</sup> The plans for the original Great Western Power transposition towers included a schematic, dated October 11, 1912, of an Ohio Brass suspension hook with a raised B on the right face of the hook. The relevant hook from Tower 27/222 matched the schematic except the raised B was on the left face of the hook.

<sup>22</sup> PG&E responded to questions about the make, model and manufacturer of the conductor on Tower 27/222 by referring to an April 1922 article written by W. A. Scott in Engineering World entitled “Great Western Power Co.’s 165,000-Volt Transmission Line”.

<sup>23</sup> The front portion of the C hook that broke off was never recovered. Cal Fire personnel spent several days meticulously searching the area below Tower 27/222 and could not locate that broken piece. It was noted however that area was on a steep rocky slope which ran off toward the Feather River Canyon.

phase hanger hole showed substantial wear where the hole and hook connected. {Attachment 11}

Investigators also noted there were original hanger holes on both the left and right transposition arms that showed extensive wear. It was obvious the bolted-on hanger plates with their holes were replacements for these original hanger holes indicating that PG&E was aware that the hooks and holes were rubbing on each other causing wear. The wear patterns observed on the hanger holes is described as “keyholing.”

As a result of the observations of the Cal Fire investigators, an inspection of other transposition towers<sup>24</sup> on the Caribou-Palermo line was initiated by the Butte County District Attorney. Based upon the historical records and the C hooks and hanger holes from Tower 27/222, investigators from Cal Fire and the Butte County District Attorney’s Office concluded that any more than 3/16” space between top of the C hook and top of the hole indicated wear to either the C hook or the hanger hole, or both<sup>25</sup>. In January 2019, investigators from the Butte County District Attorney’s Office flew the Caribou-Palermo line in a county helicopter and documented transposition towers on which the gap between the top of the C hook and the top of the hanger hole were substantially larger than 3/16.”

From the helicopter, investigators located wear to C hooks and hanger holes on three other transposition towers on the Caribou-Palermo line between the Caribou Powerhouse and the Big Bend Substation. The towers were identified as tower numbers 20/160, {attachment – 20/160 wear}24/199 {Attachment – 24/199 wear} and 35/281. {Attachment – 35/281 wear} This wear was similar to that found on the C hooks and hanger holes on Tower 27/222. Subsequently, Butte County District Attorney investigators and Cal Fire investigators, along with Jon McGormley - an engineer and failure analysis expert,<sup>26</sup> further inspected each of these three towers. Investigators and Mr. McGormley also identified a fourth transposition tower, tower number 32/260, {attachment – 32/260 wear} on which there appeared to be very little wear between the C hooks and hanger holes. Tower numbers 20/160, 24/199, 27/222 and 35/281 were all located on ridgelines and exposed to the wind. Tower 32/260 was located in a valley where it was protected from the wind.

During the inspection of one of the four towers - Tower 24/199 - investigators noted that, similar to Tower 27/222, bolted-on hanger plate holes had been added to the transposition arms and the C hooks were hanging from those hanger holes instead of the original hanger holes of the transposition arm. This again indicates that PG&E was aware of the wear on C hooks and

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<sup>24</sup> Because transposition towers have unique physical characteristics, investigators focused only on transposition towers. Transposition towers on the Caribou-Big Bend section are distinguished from other towers by the T mast atop the tower and the transposition arms on the source side of the tower. Towers 20/160, 24/199, 32/260 and 35/281 were transposition towers identical to Tower 27/222.

<sup>25</sup> According to the original schematics of the transposition towers the C hooks were 15/16” thick at the point of contact and the hanger holes were 1 1/8” in diameter. The hooks were intended to fit snugly into the holes.

<sup>26</sup> Jon McGormley was retained by Cal Fire and is an engineer and failure analysis expert with Wiss, Janney, Elstner Associates (WJE). WJE is a global firm of engineers, architects and materials scientists with a division focused on failure analysis.

hanger holes. It appeared to investigators that, at some previous time, the jumper conductor on Tower 24/199 {[Attachment – 24/199 jumper](#)} had been shortened and spliced together using a parallel groove connector. PG&E has no records of when or why this work was done.

Investigators further observed the right phase<sup>27</sup> insulator string appeared to be less aged than the left phase insulator string and, as a result of the shorter jumper conductor, was not hanging plumb. From the ground, investigators also observed black marks on the tower leg nearest the right phase insulator string. This was indicative of arcing due to faulty or broken equipment. On the ground below Tower 24/199, investigators found an old insulator string.<sup>28</sup>

With the assistance of PG&E<sup>29</sup>, investigators seized C hooks and transposition arms from two of the three towers<sup>30</sup> with obvious wear and the tower without obvious wear. Seizure of all of the C hooks and transposition arms was catalogued and documented by a Federal Bureau of Investigation (FBI) Evidence team. Of the four towers, Tower 24/199 was found to be the most similar to Tower 27/222 in terms of topography, meteorology and wear. The right phase C hook from Tower 24/199 was the most worn C hook found on any of the towers.

The C hooks, transposition arms, and hanger plate holes from Towers 27/222 and 24/199 were sent to the Metallurgy Unit of the FBI Laboratory at Quantico, Virginia for metallurgical analysis by their recognized metallurgical experts. The C hooks were examined for defects. No defects were found. The broken left phase C hook from Tower 27/222 and the most worn right phase C hook from Tower 24/199 were determined to be malleable cast iron. The least worn C hooks from Towers 27/222 and 24/199 were determined to be forged, plain carbon steel. The broken C hook from Tower 27/222, the most worn hook from Tower 24/199, and a less worn hook were tested for hardness.<sup>31</sup> The testing determined there was a significant difference in hardness between the most worn malleable cast iron hooks, and the least worn forged plain carbon steel hook. The transposition arms were also examined and analyzed, and all four transposition arms and the bolted on hanger brackets were found to be made of galvanized plain carbon steel.<sup>32</sup>

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<sup>27</sup> The term phase relates to the connection between the tower structure and the conductors. The Caribou-Big Bend section has three conductors and three phases; left, center and right.

<sup>28</sup> This was not unusual. Under numerous towers on the Caribou-Palermo line investigators found discarded insulator strings, insulator bells, conductor line and steel members.

<sup>29</sup> Any work on an electrical transmission tower requires special training and equipment. Investigators were unable to identify any qualified persons to perform the work. As a result, investigators had to rely on PG&E personnel to remove the relevant components from Tower 27/222 in November, 2018 and Towers 20/160, 24/199 and 32/260 in March, 2019.

<sup>30</sup> The C hooks and transposition arms from the fourth tower, 35/281, were replaced by PG&E in February, 2019. Those C hooks and transposition arms were seized by Cal Fire and BCDA investigators from a PG&E evidence storage facility.

<sup>31</sup> The Superficial Rockwell HR30TW hardness test was used to determine hardness.

<sup>32</sup> All of the transposition arms and hanger brackets were tested for hardness utilizing the Rockwell HRBW hardness test.

The FBI Lab scanned all of the hooks and transposition arms. The scans were used to build 3D models of each of the components. {[Attachment – 3D models download and open with Adobe Acrobat Pro](#)}

The metallurgist at the FBI Lab also analyzed the wear patterns on the C hooks and hanger holes (both original holes and the added brackets). The metallurgist determined that as a result of rotational body on body wear, the edge of the hanger holes had cut a channel into the C hooks and the C hooks had worn away the bottom of the hanger holes elongating the holes<sup>33</sup>.

{[Attachment – Camp Fire Presentation 3:29-3:46](#)} On the broken C hook from Tower 27/222 it was determined the channel had cut approximately 14/16" {[Attachment – FBI lab photo of break](#)} into the hook before the remaining metal broke under the weight of the insulator string and jumper conductor.<sup>34</sup> On the most worn C hook from Tower 24/199 it was determined that the channel had cut approximately 12/16" channel into the hook.

Under microscopic analysis, the FBI Metallurgist also observed the channeling of the right phase C hook from Tower 24/199 showed a distinct change in angle. The metallurgist testified it was her opinion the distinct change in angle could have been caused by shortening of the jumper conductor which changed the position and angle of the insulator string attached to the C hook.

The FBI data, along with LIDAR scans<sup>35</sup> of Towers 27/222 and 24/199, was forwarded to Jon McGormley. Using this information, Mr. McGormley was able to build a computer model of Tower 27/222. The model took into account the differing hardness of the C hooks and hanger holes.<sup>36</sup> Working with meteorologist Kris Kuyper<sup>37</sup>, Mr. McGormley and his team created a wind load model of the Feather River canyon, enabling them to calculate that the wear on the broken C hook from Tower 27/222, as well as the most worn C hook from Tower 24/199, was consistent with approximately **97 years of rotational body on body wear.**<sup>38</sup> {[Attachment – Camp Fire Presentation 3:52-3:54](#)}

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<sup>33</sup> Known as keyhole wear or “keyholing.”

<sup>34</sup> According to PG&E written response to CPUC data request SED-007 question 2 each suspension hook supports approximately 142.8 pounds.

<sup>35</sup> Lidar scans were performed by the Cal Fire Lidar Team.

<sup>36</sup> The hardness of the individual metals involved plays a significant role in body on body wear. Metallurgical data from the FBI Laboratory was provided and fed into the model. The Superficial Rockwell HR30TW results for the C hooks and the Rockwell HRBW results for the transposition arms were converted using ASTM E140 for comparison purposes. On the Vickers Kg/mm<sup>2</sup> the broken hook from 27/222 scored 114 for hardness, the most worn hook from 24/199 scored 119 for hardness and the least worn hook scored 222, the transposition arm and bracket from 27/222 scored 134 and 152 for hardness, the transposition arm and bracket associated to the most worn hook on 24/199 scored 120 and 138 for hardness and the transposition arm and bracket associated to the least worn hook scored 118 and 152 for hardness.

<sup>37</sup> Kris Kuyper is the former Chief Meteorologist for Action News in Chico. Kuyper was retained as an expert by the Butte County DA.

<sup>38</sup> The transposition arms metal (around the original hanger holes) was less hard than the bolted-on hanger plate hole metal. The original hanger holes showed significantly more keyhole wear than the bracket holes.

## **V. INSPECTION AND PATROL POLICIES**

State and federal regulatory requirements dictate PG&E must establish and follow set guidelines for patrol, inspection and maintenance of its overhead electric transmission lines. The 2012 Quanta Technology “Transmission Line Inspection Procedures Final Report”<sup>39</sup> outlined the various regulatory requirements. Among these requirements is CPUC General Order (GO) 165. Section IV of this General Order states “[e]ach utility shall prepare and follow procedures for conducting inspections and maintenance activities for transmission lines.”<sup>40</sup>

Since 2005, PG&E electric transmission inspection, patrol, and maintenance policies have been set forth in the “Electric Transmission Preventative Maintenance Manual” (ETPM). According to the ETPM: “Inspection and patrol procedures are a key element of the preventive maintenance program. The actions recommended in this manual reduce the potential for component failure and facility damage and facilitate a proactive approach to repairing or replacing identified, abnormal components.”

### **a. 1987 Inspection and Patrol Bulletin**

Prior to the implementation of the ETPM in 2005, inspection and patrol policies were documented in “bulletins”. The oldest bulletin provided by PG&E was dated November 1, 1987<sup>41</sup>, and entitled “Routine Patrolling and Inspection of Transmission Lines.” This bulletin stated patrols are performed “to ensure that the transmission facilities are in good repair in order to maintain a high standard of service, reliability, and safety, and the patrol policy is consistent with GO95.”<sup>42</sup> In this 1987 bulletin, the terms “patrol” and “inspection” were used interchangeably.

The 1987 policy divided PG&E’s electrical transmission system into 4 parts: Class A circuits, Class B circuits, Class C circuits, and Underground. For overhead circuits,<sup>43</sup> the patrol or inspection cycles were determined by the class designation of the circuit. A PG&E troubleman,<sup>44</sup> who worked in the Feather River Canyon between 1987 and 1995, established the Caribou-Palermo line was considered a “Class B Circuit.” As such, under the 1987 policy the Caribou-Palermo line was required to be patrolled three times each year: one ground patrol and two aerial patrols. In addition, the 1987 policy required climbing inspections of five percent of the tower structures per year; and an infrared patrol<sup>45</sup> every five years. According to the 1987 policy bulletin, all patrols of transmission lines were to be completed by a “Transmission Troubleman.” This policy ensured that every overhead transmission structure would be climbed

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<sup>39</sup> Quanta Technologies is a multi-national electrical utility consulting company. Quanta Technologies was retained by PG&E in 2011 to review the ETPM. This report was commissioned by, and paid for by, PG&E.

<sup>40</sup> The California Independent System Operator (CAISO) “Transmission Control Agreement” and Western Electricity Coordinating Council (WECC) standard FAC-501 also require PG&E to have and follow written policies for inspection and maintenance of electrical transmission lines.

<sup>41</sup> The 1987 bulletin was the sixth revision of an existing policy bulletin and replaced the fifth revision which was published December 1, 1984 according to the face page of the 1987 bulletin. Based upon interviews with PG&E linemen from the 1970s and 1980s it is believed that the original policy bulletin was published 1972-75.

<sup>42</sup> GO95 is General Order of the CPUC number 95. GO95 establishes building, maintenance and replacement regulations for electrical transmission.

<sup>43</sup> A circuit is the path electrical current flows. In the 1980s PG&E referred to transmission lines as circuits. Distribution lines are still referred to as circuits. Transmission lines are now referred to as lines.

<sup>44</sup> See Section VII “Troublemen and Training” below for the definition of the position of Troubleman.

<sup>45</sup> An infrared patrol uses infrared, thermal cameras to identify hot spots on the line. Hot spots may indicate a defect or weakness on the line.

at least once every 20 years. Because PG&E inspection/patrol records prior to 2000 are not available, it is unknown if Tower 27/222 was one of the towers subjected to a climbing inspection between 1987 and 1994.

Appendix A to the 1987 policy bulletin contained a checklist of “Conditions to be noted when patrolling lines.” One of the conditions to be noted was “Worn hardware and connectors.” Through interviews with transmission linemen, troublemen, and engineers, it was established the C hooks were technically part of the “cold end attachment hardware.”

Former PG&E Transmission Line Supervisors from 1987 noted the checklist inclusion of “worn hardware” was a result of a 1987 PG&E Laboratory Test Report<sup>46</sup> documenting a worn C hook and hanger hole from a Bay Area transmission tower<sup>47</sup>. Photos of the worn C hooks and holes were distributed to troublemen in all of the PG&E regions for training purposes, and inspection of C hooks and hanger holes was made a specific priority during inspections/ patrol.

#### **b. 1995 Inspection and Patrol Policy**

The 1987 policy remained in effect until it was replaced by the “ES Guideline” in 1995. The 1995 ES Guideline made substantial changes, specifically separating out patrols from inspections. Inspection frequency was determined by a transmission line score on an “Inspection Frequency Checklist” and drastically reduced the frequency and thoroughness of inspections. The Caribou-Palermo line was reduced from three patrol/inspections (one ground/two aerial) per year to one ground inspection every 24 months and one aerial inspection every 24 months. Required routine climbing inspections were eliminated. Climbing inspections would only occur if “triggered” by one or more specific findings listed as triggers.

#### **c. 2005 ETPM Inspection and Patrol Procedures**

The 1995 policies remained in effect until they were replaced by the ETPM in 2005. According to the ETPM section entitled General Inspection and Patrol Procedures, “[t]hese inspection and patrol procedures were developed as a key element of the preventative maintenance program. The recommended actions were selected to reduce the potential for component failures and facility damage and to facilitate a proactive approach to repairing or replacing identified, abnormal components.”

The ETPM differentiated between inspections and patrols, and established definitions for each. According to the 2005 ETPM in the Detailed Overhead (OH) Inspections section:

“A detailed ground, aerial or climbing inspection of the asset<sup>48</sup> looks for abnormalities or circumstances that will negatively impact safety, reliability, or asset life. Individual elements and components are carefully examined through visual and/or routine diagnostic tests and the abnormal conditions of each are graded and/or recorded.

Overhead line facilities are to be inspected in accordance with the provisions in Section 2.0 of this manual. The inspections are to include detailed visual observations,

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<sup>46</sup> The Laboratory Test Report was published approximately nine months before the Inspection and Patrol Bulletin. This Laboratory Test Report is described more fully in Section XVII “Knowledge of Risk/Consequence.”

<sup>47</sup> Based upon historical records it is believed that the tower was part of the original Caribou-Valona line built 1918-1921.

<sup>48</sup> An asset is a structure, pole or tower.

operational readings, and component testing to identify abnormalities or circumstances that will negatively impact safety, reliability or asset life.”

The 2005 ETPM **Patrols** of overhead transmission assets section states that:

“The QCR’s<sup>49</sup> primary responsibility in an overhead electric facility is to visually observe the electric facilities, looking for obvious structural problems or hazards without the use of measuring devices, tools, or diagnostic tests, and to record that the facilities have been patrolled.”<sup>50</sup>

The ETPM adopted verbatim the 1995 policy on climbing inspections and triggers. According to section 3.4:

“A climbing inspection is a detailed, supporting structure based observation of the facilities installed to determine if there are any abnormal or hazardous conditions that adversely impact safety, service reliability or asset life, and to evaluate when each identified abnormal condition warrants maintenance.”

Climbing inspections may also be required for specific structures or components to properly assess a condition found during a ground or aerial inspection or patrol that could not be adequately assessed during the inspection of patrol.”

As of the 2005 ETPM, the Caribou-Palermo line was reduced to only being inspected once every five years and patrolled once per year in non-inspection years. (This reduction again is from the three patrol/inspections per year prior to 1995.)

The 2006 revision of the ETPM appears identical to section 2 of the 2005 ETPM and identifies the “Best View Position” for individual components on a transmission structure.<sup>51</sup> According to Table 2.3-1 the best position to view insulators and hardware is aerial inspection (not patrol), ground inspection above 10’, and climbing inspection. The terms “aerial inspection” and “ground inspections above 10’” were not specifically defined in the ETPM. According to former PG&E personnel, an “aerial inspection” is significantly more detailed than an “aerial patrol” and requires a helicopter to fly 360 degrees around each structure at an altitude and speed which allows for detailed inspection of the structure components. A ground inspection above 10’ involves the use of a bucket truck to lift the QCR to allow for close inspection of the top part of the structure.

#### **d. Patrol and Inspections Subsequent to the 2005 ETPM**

Since 2005 the ETPM has been revised on multiple occasions<sup>52</sup>. The revisions have not changed the inspection or patrol cycles or the requirements for inspections and patrols. At the time of the Camp Fire, the third revision of the ETPM, issued May 12, 2016 was in use. Shortly after the Camp Fire, on November 20, 2018, the 4<sup>th</sup> revision of the ETPM<sup>53</sup> was published. Among other changes, the fourth revision of the ETPM incorporated new requirements for the prioritization and correction of safety hazards in Tier 2 and Tier 3 high fire threat areas identified in the 2018

<sup>49</sup> QCR is Qualified Company Representative. See section VII-“Troublemen and Training” for more information.

<sup>50</sup> See Section VII “Troublemen and Training” below for the definition of the position of QCR.

<sup>51</sup> Copies of the 2005 ETPM provided by PG&E were missing page 2-4.

<sup>52</sup> Revised editions of the ETPM were published in October 2006, April 2009, January 2011, December 2014, May 2015, May 2016 and November 2018

<sup>53</sup> Although the May 2016 revision was the sixth revision of the ETPM, PG&E did not start numbering revisions until the December 2014 edition, which was designated revision one.

CPUC Fire Threat Map.<sup>54</sup> These changes were required by amendments to GO95 by the CPUC, which took effect in January 2018.<sup>55</sup>

**e. The 2012 Quanta Report**

The 2012 Quanta Technologies “Transmission Line Inspection Procedures Final Report” was a “comprehensive review of Pacific Gas and Electric’s (PG&E) current standards and practices used for ground patrol inspection of overhead transmission lines.”<sup>56</sup> According to the report, the ETPM was “found to be a comprehensive, well written document that adhered to its purpose to “ensure uniform and consistent required procedures for patrols, inspections, equipment testing, and condition assessment of electric transmission line facilities.” Quanta did not, and the report did not, evaluate the actual use, or non-use, of the ETPM by PG&E.

The evidence clearly established that PG&E did not, in fact, follow the procedures and requirements established in the ETPM. Based upon the evidence, it is reasonable to conclude that sections of the ETPM relating to inspections and patrols of overhead electric transmission lines were simply a façade created to meet the requirements of the regulators and the CAISO<sup>57</sup>.

**VI. REDUCTION OF UNIT COSTS FOR INSPECTIONS AND PATROLS**

Although there were no changes to the frequency of inspections and patrols between the 2005 and 2018 ETPMs, the evidence established PG&E considered further reducing the frequency of inspections and patrols. According to 2013 internal PG&E PowerPoint, a committee was formed to explore opportunities to reduce costs by reducing the frequency of inspections and patrols and examine said “unit costs.” According to the “Problem Statement:”

“Tline<sup>58</sup> patrols/inspection have not been modified in approximately 10 years relative to frequency and work methods. There may be opportunities to reduce costs by 1) changing frequency of patrols/inspections or 2) finding more efficient work practices. Benchmarking PG&E’s practices against other utilities may identify potential opportunities for efficiency savings.”

Under the heading “Business Objectives:”

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<sup>54</sup> On January 19, 2018, the CPUC adopted and published the CPUC Fire-Threat Map. The Fire-Threat Map identified elevated (Tier 2) and extreme (Tier 3) fire threat areas in the State of California.

<sup>55</sup> In conjunction with the Fire-Threat Map, the CPUC amended GO 95 to add regulations to enhance fire safety in Tier 2 and Tier 3 fire threat areas.

<sup>57</sup> California Independent System Operator Corporation. CA ISO is a private, non-profit corporation that manages the high voltage power grid and the wholesale energy market for most of California. CA ISO was created in 1997 as part of an effort to restructure the wholesale electric industry in California. CA ISO is not a regulator. CA ISO’s power over electric transmission utilities derives from the Transmission Control Agreement entered into between CA ISO and the utilities. In the Transmission Control Agreement the utilities agree to, among other things, properly maintain electric transmission lines, provide CA ISO with all current maintenance policies (referred to as a Transmission Owner Maintenance Practices (TOMP)). Failure to comply with the terms of the Transmission Control Agreement could be a breach of contract.

<sup>58</sup> PG&E abbreviation for Transmission line

Define improvements in our frequency, tools or processes to find efficiencies in the patrols/inspections.

Perform benchmarking and analysis to measure current practices

Determine frequency of patrols/inspections (are we doing more than industry standard)

Analyze current patrols/inspections work methods (i.e. crew size)

Under the heading “Scope”

Patrols and Inspections for Transmission Lines

Frequency of patrols/inspections

Work methods/practices (tools, crew size, processes)

Unit costs measurement

Emails obtained from PG&E established committee members subsequently met with other electrical utilities for the purpose of benchmarking inspection and patrol practices of those utilities and submitted to a national electrical utilities association a patrol and inspection survey to be distributed to and completed by its members. This was done despite the fact the 2010 Quanta Technologies “Structures” Report<sup>59</sup> included data on patrol and inspection frequency gathered from a survey of 104 electrical utilities worldwide conducted in 2003 by the International Council on Large Electrical Systems, also known as Cigre<sup>60</sup>. According to the Cigre’ study 74% of the companies utilized “Walking” inspections, 63% utilized “Climbing” inspections and 66% utilized “Helicopter” inspections. The average inspection period for each type of inspection was 1.4 years for walking, 1.5 years for helicopter and 4.2 years for climbing.

The lack of change in inspection and patrol frequency in subsequent revisions of the ETPM indicates that reduction of inspection and patrol frequency was not approved. The committee was also exploring opportunities to reduce costs by finding more efficient work practices. A key component of this inquiry was “Unit cost measurement.” The evidence indicates that PG&E reduced costs by reducing the unit cost for each inspection and patrol. The evidence shows that this was accomplished by reducing the thoroughness of the inspections and patrols.

Review of internal PG&E documents, including emails, and interviews with PG&E personnel determined that the unit cost for inspection and patrol is calculated based upon the time that a troubleman spends inspecting an individual structure. Based upon interviews it was established that each year PG&E determines an average unit cost for each type of inspection or patrol. The unit cost would be translated into time and multiplied by the total number of structures on an individual line. The result would be the time allotted for the inspection or patrol of that transmission line. Prior to the start of each calendar year each transmission region headquarters was provided a list of inspections and patrols, including the allotted time, scheduled for the following year. The inspection and patrol budgets for each transmission region headquarters was based upon the total allotted time for all scheduled inspections and patrols. The evidence established that the Business Finance Department of the Electric Transmission Division sent monthly budget reports tracking spending, both monthly and year to date, for inspection and patrol against budget allocations. The reports were color-coded - red for over budget and green

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<sup>59</sup> In 2009 PG&E hired Quanta to evaluate its electrical transmission system. In 2010 Quanta submitted to PG&E the Transmission Line Component Management Report which included the Structures Report.

<sup>60</sup> Cigre is an international association of electrical transmission companies located in Paris, France. Cigre was established in 1921 and claims 1250 member organizations from 90 countries.

for under budget. The evidence also established that salary incentives (bonuses) of Transmission Line Supervisors and Transmission Superintendents was, at least partially, based upon compliance with the inspection and patrol budget.

Based upon the evidence, PG&E reduced costs of inspection and patrol by reducing the amount of time budgeted for the inspections and patrols. As expected, the result of these reductions was less thorough and less complete inspections and patrols.

## **VII. TROUBLEMEN AND TRAINING**

### **a. Creation of the Troubлемan Program**

The evidence established the inspection and patrol of the transmission lines is done by the “Troublemen.” Similar to the inspection and patrol policy, the position of Troubлемan has evolved and changed. Based upon interviews with former PG&E employees from the 1980s, the evidence established the position of Transmission Troubлемan was created in the mid-1980s. The earliest reference to troublemen in documents provided by PG&E is found in the 1987 “Routine Patrolling and Inspection of Transmission Lines” policy bulletin.

According to the original Transmission Line Supervisors interviewed, the Transmission Troubлемan position was initially intended to be a qualified and experienced transmission line expert. According to one of the original Transmission Lines Supervisors the “intent here was to have people that knew exactly what to look for, how to establish priorities on repairs, and would, would keep it operating.” In addition to the physical demands and climbing requirements of the position, the Troubлемen were also expected to take ownership of individual transmission lines and be accountable for the continued safe and reliable operation of that line.

### **b. Troubлемan Training**

The 1987 “Routine Patrolling and Inspection of Transmission Lines” policy memo established training requirements for the new Transmission Troubлемen<sup>61</sup>. In the late 1980s, training for Transmission Troubлемen included periodic meetings of all of the Transmission Line Supervisors and Troubлемen. At these meetings issues and problems were shared and discussed. According to one of the original Transmission Line Supervisors, a supervisor was designated to document and/or collect all of the examples presented at the meetings in order to compile a training manual for future Transmission Troubлемen. According to several of the original Transmission Line Supervisors and Troubлемen, an inspection checklist was developed based in part on the information being shared at these meetings. Appendix A to the 1987 “Routine

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<sup>61</sup> “It is the responsibility of each Region to ensure proper training of personnel conducting line patrols. This is to be accomplished through use of periodic training classes for all transmission troublemen and any other personnel who may be called upon to patrol. The training should include a review of this bulletin, other T&D bulletins as appropriate, patrol safety, Engineering Drawing 022168, and G.O. 95 requirements. The use of available videotapes (spacer damage, infrared patrolling, etc.) is encouraged. Particular attention should be given to the specific items listed on the code sheet that is provided with this bulletin. The Transmission and Distribution Department will assist the Regions in setting up and conducting the training classes.”

Patrolling and Inspection of Transmission Lines” policy memo appears to be the earliest form of the checklist.

In addition to eliminating routine climbing inspections, reducing the frequency of inspections, and creating an Inspection Frequency Checklist, the 1995 ES Guideline eliminated the training requirement for troublemen. Notwithstanding that, the training requirement was dropped from the ES Guideline, the evidence does show that PG&E had created a Troublemans training program. According to one of the former PG&E employees involved in the creation of the 1995 ES Guideline, one of his duties from 1995 until 2005, was to provide direct annual training on inspection and patrol policies and requirements to all Troublemans. According to this former employee, a decision was made in 2005 to eliminate direct training of Troublemans. Instead, the Transmission Line Supervisors were provided training and expected to train the Troublemans under their supervision.

In December 1997, PG&E filed its first “Transmission Owner Maintenance Practice (TOMP) with the CA ISO<sup>62</sup>. In the TOMP the term “Troublemans” was replaced with the term “Inspector”. According to the definition of terms, an Inspector is a “PG&E employed inspector commonly referred to as “troubleman.”

In the 2002 “Transmission Owner Maintenance Practice” (TOMP) the term Inspector was replaced with “Qualified Company Representative (QCR). According to the Definition of Terms, a QCR is “a person, who by reason of training and work experience is able to complete an accurate assessment of the electric transmission facilities that he/she is asked to inspect.” The required training and work experience necessary to be considered a QCR was never defined.

In the first version of the ETPM (2005), the term Troublemans does not appear. Instead, the ETPM continues the use of the term QCR. The 2005 ETPM definition of a QCR differed from the definition in the TOMP – “A Company representative who, by knowledge, required training, and/or work experience, is able to prepare an accurate and complete assessment of electric transmission facilities.” The definition of a QCR continued to evolve through each revision of the ETPM. According to the 2018 ETPM a QCR is “A company representative, who, by knowledge, required training and/or work experience, is able and allowed to perform a specific job. For the purposes of this manual, QCR refers to an employee qualified to prepare an accurate and complete assessment of electrical transmission facilities.” The ETPM does not define the knowledge, training or work experience required of a QCR.

Every QCR who has inspected or patrolled the Caribou-Palermo line since the publication of the ETPM in 2005 was interviewed. All of the QCRs denied having receiving any formal training on how to perform an inspection or patrol. According to all of the QCRs, any inspection and patrol training was limited to filling out reporting forms and notifications for any issues

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<sup>62</sup> California Independent System Operator Corporation. CA ISO is a private corporation that operates the high voltage grid in California. CA ISO monitors the flow of power in transmission lines that providers use, operate wholesale electricity markets for energy and ancillary services, and maintain transmission maintenance standards. Transmission owners (TO’s) mutually agree to contract with them. CA ISO was created by the State of California in 1997 in an effort to restructure the wholesale electric industry in California.

identified during an inspection or patrol. All of the QCRs asserted that the only training on how to perform an inspection or patrol was via informal mentoring by other, more experienced, Troublemens.

The evidence also established that some of the QCRs performing inspections and patrols of the transmission lines in the Feather River Canyon had little or no transmission line experience before becoming a Troubлемen.<sup>63</sup>

Although PG&E documents and management personnel assert that troublemen receive training on the requirements of the position, the troublemen themselves unanimously denied having received any formal training on conducting inspections and patrols and assessing wear. The troublemen also denied being provided with any records (for example tower schematics) specific to the transmission lines being inspected. The lack of specific training and records was especially significant for troublemen inspecting the Caribou-Palermo line. The hanger holes, according to the original schematics, were 1 1/8" in diameter and the C hooks were 15/16" thick at the contact point. On other Feather River Canyon transmission lines the C hooks were the same size but the hanger holes were significantly larger. The evidence established that the Troublemens' lack of knowledge of the different sized hanger holes contributed greatly to the failure of PG&E to recognize the degree of wear on the C hook on Tower 27/222.

The evidence established that, despite the lofty goals of the originators of the troubleman position, and the designation of QCR by PG&E, by 2007 the inspections and patrols of the Caribou-Palermo line were being conducted by inexperienced, untrained and unqualified troublemen. Both of the "Detailed Ground Inspections (2009 and 2014) and seven of the ten Annual Air Patrols on the Caribou Palermo were completed by troubleman who had little or no prior transmission experience, and no formal training on performing inspections and patrols. This is contrary to the third Revision of the ETPM which requires that the "QCRs must be thoroughly familiar with all of the facilities, equipment, safety rules and procedures associated with the facilities and equipment." Under the ETPM the QCRs are supposed to be looking at components and estimating wear by percentage of material lost. In order to judge material loss a troubleman would have to know what a component looked like at 100%. The majority of the troubleman sent to inspect and patrol the Caribou-Palermo line had no idea what the C hooks and hanger holes were supposed to look like. Because of their lack of knowledge, experience, and training, the troubleman could not have been expected to identify the wear. The overwhelming

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<sup>63</sup> One former troubleman assigned to the Caribou-Palermo line admitted that although he was a journeyman lineman, he worked in distribution (almost 30 years) and had never worked as a transmission lineman prior to becoming a transmission troubleman. Another troubleman assigned to the Caribou-Palermo line was also a distribution lineman prior to becoming a transmission troubleman and admitted his only experience with transmission lines above 60kV was during his apprenticeship. According to a former Table Mountain HQ Transmission Line Supervisor, this Troubлемен had so little experience with transmission lines that he was assigned to work with the transmission lineman until the Supervisor was forced by the union to allow the troubleman to conduct inspections and patrols. Another former troubleman assigned to the Caribou-Palermo line had worked on transmission lines as a journeyman lineman until PG&E split distribution and transmission in the mid-80s. The former troubleman worked in distribution exclusively for over twenty years before becoming a transmission troubleman.

evidence clearly established that troublemen and linemen inspecting and patrolling the Caribou-Palermo line did not meet the standards established in the ETPM.

## **VIII. FAILURES IN MAINTENANCE, REPAIR AND REPLACEMENT RECORD KEEPING ON THE CARIBOU-PALERMO LINE**

As part of the Camp Fire Investigation, all maintenance/repair/replacement records for the Caribou-Palermo line were requested and obtained from PG&E. Any and all records received from PG&E pertaining to Towers 27/222 and 24/199 were reviewed in depth. The only records of any maintenance/repair/replacement located for these towers related to the replacement of parallel groove connectors<sup>64</sup> {[Attachment – parallel groove connector](#)} on each tower in 2016.

### **a. Hanger Brackets**

During the investigation it was observed that “hanger brackets” (bolted add-on brackets for hanger plates for the hole that the C hooks hung from) {[Attachment – add-on hanger bracket](#)} had been added to the transposition arms of towers 27/222 and 24/199. Similar hanger brackets were not found on other transposition towers and the brackets were not shown on the original plans for the transposition arms. After being removed from the towers, the transposition arms were examined. Some of the original hanger holes displayed significant “keyhole” wear. {[Attachment – significant keyhole wear](#)} PG&E was unable to produce any records of when, why, and by whom the hanger brackets had been added. Based upon the keyhole wear observed on the original hanger holes, the only reasonable conclusion to be drawn was someone at PG&E at some time in the past had noticed the keyhole wear and was concerned enough to take action.

### **b. Parallel Groove Connectors**

As previously mentioned, during the inspection of Tower 24/199 investigators noticed a parallel groove connector on the jumper conductor. {[Attachment – parallel groove connector on 24/199 jumper](#)} It appeared to investigators that, at some previous time the jumper conductor had been shortened and spliced together using the parallel groove connector. Investigators also observed that the right phase insulator string appeared to be less aged than the left phase insulator and, as a result of the shorter jumper conductor, was not hanging plumb. From the ground, investigators also observed black marks on the tower leg nearest the right phase insulator string. On the ground below Tower 24/199, investigators found an old insulator string. The old insulator string was complete except for the C hook.

PG&E was unable to produce any records of when, why, and by whom the parallel groove connector had been added to the jumper. No explanation was provided as to why the parallel groove connector on the jumper conductor was not replaced when all of the other parallel groove connectors in the tower were replaced in 2016. PG&E was also unable to produce any records as to the replacement of the insulator. Based upon the observations of investigators, the only reasonable conclusion that could be drawn is that at some time in the past the jumper conductor made contact with the tower leg, causing the blackening observed on the tower leg. This damaged the jumper conductor, necessitating the removal of a portion and replacement of the

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<sup>64</sup> Parallel groove connectors are used to connect two parallel pieces of power line (conductor).

insulator. It was also clear, based upon the change in the wear pattern on the C hook observed by the FBI metallurgist, the C hook was not replaced when the jumper conductor was shortened and the insulator changed.<sup>65</sup>

Although no records were found to explain why, the evidence established that as part of a scheduled Detailed Ground Inspection in 2009, the troubleman assigned to complete the inspection of the Caribou-Palermo line was instructed to document all towers with parallel groove connectors and create work orders for replacement of the parallel groove connectors. In total, the “Transmission Line Inspection Datasheet” completed by the troubleman as part of the report of the 2009 Detailed Ground Inspection, lists 85 towers for “Rpl Connectors.” For each tower, a notification number was assigned and a “Corrective Work Form” was generated. Copies of these Corrective Work Forms for towers 24/199 and 27/222 were obtained during the investigation. Replacement of the parallel groove connectors was designated, according to the Corrective Work Forms as “Priority F – Schd Compl Yr 1+.”<sup>66</sup> At the time the Corrective Work Forms were created, the April 2009 revision of the ETPM was in effect. The priority code F did not exist in the 2009 ETPM. The priority codes listed in the 2009 ETPM were A, C, G and P. Prior to the April 2009 revision of the ETPM, numerical (as opposed to letter) priority codes were used. The priority code F did not come into existence until the 2011 revision of the ETPM. According to the 2011 version of the ETPM, Priority Code F is defined as “Corrective action is recommended within 24 months from the date the condition is identified, except for nominations notifications or system wide initiatives identified by Asset Strategy (e.g., bridge bonding, shunt splicing), which can have due dates beyond 24 months.”

According to the Corrective Work Forms for Towers 27/222 and 24/199, the parallel groove connectors were re-assessed during the 2011 Annual Air Patrol. A note dated August 16, 2011, states “per (troubleman) on 8/1/11 during patrol OK to move out 2 yrs.” On November 10, 2009,<sup>67</sup> PG&E Applied Technology Services (ATS)<sup>68</sup> published a Lab Test Report entitled “Analysis of bolted aluminum transmission connectors from various PG&E sites.” Based upon the ATS Lab Test Report the problems identified were internal to the connector. There is nothing in the report documenting any outward signs of the interior wear. The question of how a troubleman flying in a helicopter could assess the wear inside the bolted connectors was never answered<sup>69</sup>.

A note on both Corrective Work Forms dated January 10, 2012, states “move required end date to 11/30/2015.” No explanation is given as to why the required end date was moved back three

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<sup>65</sup> According to PG&E and all transmission lineman interviewed, it was standard practice to replace the used C hook when replacing an insulator string. While inspecting the Caribou-Palermo line in February and March 2019 investigators noted another tower in which the insulator strings had recently (post Camp Fire) been changed but the C hooks were re-used.

<sup>66</sup> In a written response to a CPUC data request PG&E wrote “Between 10:41 a.m. and 10:42 a.m. on October 4, 2009, all 85 notifications were changed from Priority Code G to Priority Code B conditions by {name redacted}, the same PG&E contractor who changed the Priority Code on LC Notification 103995542. Between 5:38 p.m. and 5:39 p.m. on October 27, 2009, all 85 notifications were changed from Priority Code B to Priority Code F conditions by {name redacted}.”

<sup>67</sup> Approximately three months after the completion of the 2009 Detailed Ground Inspection of the Caribou-Palermo line.

<sup>68</sup> Applied Technology Services is PG&E’s internal engineering and scientific research lab. ATS was previously known as the PG&E Department of Engineering Research.

<sup>69</sup> Interior wear on parallel groove connectors may cause the connector to show excessive heat in an infrared inspection. None of the Annual Air Patrols included infrared inspections.

years. PG&E addressed this issue in a Data Response to CPUC. According to PG&E's written explanation, the Corrective Work Forms were initially assigned priority code G – required repair/replacement within 12 months. On October 4, 2009, the priority code was changed to Priority B – required repair/replacement within three months in the PG&E SAP system. According to PG&E, the priority code was changed again on October 27, 2009, to Priority F. Also according to PG&E's written response to the CPUC, because the replacement of the connectors was a Priority F and was "for nominations[,] notifications[,] or systemwide initiatives identified by Asset Strategy (e.g., bridge bonding, shunt splicing), which can have due dates beyond 24 months" no documentation or reason was required for re-assessment. The quoted language is from the 2011 version of the ETPM. The 2009 version of the ETPM stated "Any reassessment must have sound business or technical supporting reasons and documentation on file and recorded in SAP." No explanation was ever provided as to how and why a priority code and exception which did not come into existence until January 2011, was being applied in October 2009.

This raised serious questions as to the accuracy of the few maintenance/repair/replace records PG&E was able to locate. The final note on the Corrective Work Form is dated June 29, 2016, and reads that the connectors were replaced on June 18, 2016. There is no record as to why the parallel groove connector on the jumper conductor of Tower 24/199 was not replaced.

In total, almost seven years elapsed between the identification of the defective parallel groove connectors on the Caribou-Palermo line and the replacement of those connectors. At least ten years elapsed from the time replacement of parallel groove connectors were identified as a fire<sup>70</sup> mitigation. No valid explanation for the extended amount of time was ever provided.

**c. The "Deteriorated Transmission Equipment Replacement Program."**

In 2007, PG&E introduced the "Deteriorated Transmission Equipment Replacement Program." According to internal documents, the Deteriorated Transmission Equipment Replacement Program was included in PG&E's capital spending five-year plan and was funded through 2015.

PG&E was unable to produce any documentation as to the budget or eligibility requirements for the Deteriorated Transmission Equipment Replacement Program. Although the name of the program implied that the program was established to replace deteriorated equipment, no records of funding or eligibility requirements for the program were found. During interviews and testimony of PG&E employees familiar with the program, it was simply a "bucket" of money available to fund capital improvements on transmission lines regardless of the condition of the line or its components. Based upon the evidence the name Deteriorated Transmission Equipment Replacement Program did not accurately depict the true nature of the program.

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<sup>70</sup> Parallel groove connectors were identified as a fire risk in the October 2006 Risk Analysis of Urban Wild Land Fires. See section XVII – "Knowledge of Risk/Consequence" for details re: the 2006 Risk Analysis.

#### **d. The Caribou-Palermo 7/55-8/64 Replacement Towers project**

A portion of the Caribou-Palermo line was nominated for replacement through this program by the Maintenance and Construction Engineer<sup>71</sup> (M&C Engineer) assigned to the North Area<sup>72</sup>. According to a PG&E internal budget document “Request for Advance Authorization of Expenditures in Accordance with Capital Expenditures Policy,” \$800,000 was initially requested “for preliminary engineering and purchase of long lead-time material to replace conductor and tower structures on a section of the Caribou-Palermo line between structures 7/55 and 8/64.<sup>73</sup>” {[Attachment – Google Earth Map showing 7/55-8/64](#)} The initial Advance Authorization specifically stated:

“There have been multiple conductor failures on this line due to conductor being annealed<sup>74</sup> and parting.<sup>75</sup> Since 2002 there have been 8 event reports created on this line. 5 of which was equipment related failures.”

“It is very time consuming and costly to correct any failures that occur in this dilapidated line section, especially during the winter months when failures are more likely.”

“The probability of that failure is imminent due to the age of both the towers and the conductor.”

“The intent of this project is to be pro-active and replace this deteriorated line section in a controlled and planned manner instead of under emergency conditions.”

The initial Advance Authorization for \$800,000 was not approved by PG&E’s Electric Asset Strategy Division, and instead, upon re-writing and re-submission, was reduced to \$200,000 by the then Director of the Electric Asset Strategy Division. The second Advance Authorization did not include the descriptor “dilapidated” or the prediction of imminent failure but did state: “Replace deteriorated structures, conductor, insulators, and hardware between structures 7/55 and 8/64.” The second Advanced Authorization was approved. The project was named the “Caribou-Palermo 7/55-8/64 RPL Towers” project.

A “Project Manager”<sup>76</sup> was assigned to this project. According to internal PG&E documents, between 2007 and 2009 the Project Manager spent almost \$800,000 conducting engineering studies of the proposed new tower sites and preparatory work, including building a road to allow access to the proposed new tower sites. In 2009, the project was canceled as, according to internal emails, “this project fell below the cut line for 2010 approved projects.” According to a 2014 email from a member of PG&E’s Capital Accounting Department the project “was canceled due to Asset Management’s reprioritization and is not expected to be resumed.” During an email chain, starting on November 2, 2009 and ending on January 22, 2010, the Project

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<sup>71</sup> Although the job title was Engineer this person was not an engineer and had no engineering education or experience. This person described his position as “You’re kind of a liaison between the field crews and both civil and electrical engineers.”

<sup>72</sup> Includes Sacramento District, Table Mountain District, Eureka District and Lakeville District

<sup>73</sup> On the southside of the Feather River between Caribou Road and Beldon.

<sup>74</sup> According to the M&C Engineer “annealed usually means a little more brittle.”

<sup>75</sup> The M&C Engineer also identified the conductor as copper and not aluminum because “we wouldn’t put shunts on aluminum.”

<sup>76</sup> A project manager is a person assigned to supervise a specific project.

Manager made the following arguments for continuing and completing the Caribou-Palermo 7/55-8/64 RPL Towers project to the Program Manager<sup>77</sup> assigned to that major work category:

“If it is not funded for permitting etc., we could be picking up these towers out of the Feather River Canyon when they fall over.”

“We have already notified FERC<sup>78</sup> of the project and it will not look good if towers we have identified as deteriorated fall over in the canyon because we did not perform the work due to funding.”

Despite the representations of the Project Manager the project was not reinstated by the Program Manager.

During interviews with investigators and testimony, the author of the Advance Authorizations<sup>79</sup> and the Project Manager separately asserted they had no factual basis for the statements about the condition of the Caribou-Palermo line towers and downplayed the statements as exaggerations made while advocating for a project.

#### **e. The Rock Fire**

A Corrective Work form<sup>80</sup> was located for replacement of a failed connector on Tower 11/87 in September of 2008. The Corrective Work Form was generated based upon a non-routine patrol of the Caribou-Palermo line generated by a power interruption on the line on September 30, 2008.

On September 30, 2008, at approximately 2:30 p.m., the Plumas National Forest Headquarters received a report of a fire near the Rock Creek Dam. {[Attachment – Google Earth map of Rock Creek Dam](#)} The fire was named the Rock Fire. This fire burned approximately five acres in the Plumas National Forest. Origin and Cause investigators from the United States Forest Service (USFS) investigated the fire and determined the origin to be directly below Tower 11/87 of the Caribou-Palermo line. The Rock Fire was determined to have been caused by an equipment failure, specifically the failure of a connector on a jumper line, on Tower 11/87. PG&E records obtained by the USFS investigators showed PG&E experienced an interruption on the Caribou-Palermo line at approximately 2:02 p.m. on September 30, 2008. No records of a root cause investigation of the failure of the connector were found. Consistent with PG&E’s practice, as supported by the evidence, PG&E did not conduct climbing or aerial inspections on other Caribou-Palermo line towers with similar connectors.

#### **f. Tower Collapse**

On December 21, 2012, a catastrophic failure occurred on the Caribou-Palermo line that generated six corrective work forms. Five towers, 22/187 through 23/191, collapsed and a sixth

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<sup>77</sup> PG&E divides electrical transmission work (repair/replace/maintain/improve) into “major work categories” (also referred to by PG&E personnel as budgetary “buckets”). The program manager oversees all projects within a major work category.

<sup>78</sup> It appears that this is a reference to a Federal Energy Regulatory Commission (FERC) rate case. In support of requests for rate increases PG&E files a rate case with FERC. To justify the proposed rate increase in the rate case PG&E lists planned capital projects with cost projection. Projects are generally forecasted five years in the future.

<sup>79</sup> A former Maintenance and Construction (M&C) engineer.

<sup>80</sup> A PG&E form generated by field personnel to document and describe problems, defects, wear or other conditions on transmission assets requiring maintenance/repair/replacement.

tower, 23/192, {[Attachment – Google Earth map of towers](#)} was badly damaged to the extent that it needed to be replaced.

A PG&E Civil Engineer investigated the incident and did not author a report, but did communicate his conclusions in an email. He determined Tower 22/188 initially collapsed causing a domino effect that pulled down towers 22/187, 22/189, 23/190 and 23/191. He concluded the collapse of Tower 22/188 was caused by the failure of the “stub angles”<sup>81</sup> possibly due to strong wind and/or icing wet ground conditions. No formal “Root Cause Analysis” was conducted. Although he concluded his analysis by stating “Due to this failure phenomenon, it would be advisable to inspect towers with similar line angle on this line to ensure no other foundations had experienced similar uplift during same wind storm.” The evidence established none of the other Caribou-Palermo line tower foundations were inspected. Again, this is consistent with PG&E’s practice of not following up on clearly established potential safety and/or maintenance issues.

The six towers were temporarily replaced by a “Shoe Fly,” consisting of fifteen wooden poles, constructed along Camp Creek road. {[Attachment – Google Earth map of Shoe Fly](#)} The Shoe Fly was completed by January 30, 2013. The Shoe Fly remained in service until the six towers were permanently replaced. The six towers were eventually, permanently, replaced by modern H-Frame tubular steel pole structures in 2016.

**g. Center Phase Conductor on Tower 24/200**

On January 10, 2014, a PG&E employee doing “crew work” documented a problem on the center phase conductor on Tower 24/200. Pictures attached to the Corrective Work Form appear to show a damaged conductor. In addition, the photos appear to show damage to the corona shield<sup>82</sup> (part of the hot end attachment hardware) and melting on the conductor below the corona shield. Another photograph appeared to show a piece missing from another section of the conductor and blackening on the conductor a few inches from that missing piece. The Corrective Work Form stated the conductor was repaired on 5/1/2014, but did not indicate that either the hot end attachment hardware generally, or the corona shield specifically, were replaced. No records were found indicating a root cause analysis was ever done to determine the cause of the damage to the conductor and corona shield.

**h. Broken J Hook**

On October 19, 2016, a J hook in Tower 11/99 broke when a member of a PG&E contractor painting crew attempted to use a cross brace attached to the J hook for support. According to the PG&E report on the incident “I[]t appears as though about 20% of the thickness of the bolt had been compromised through corrosion.” Although the incident was reported to and investigated by PG&E, nonetheless true to the company’s practice, the failure of the J hook did not cause inspections of J hooks in other similar towers.

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<sup>81</sup> The stub angles connect the foundation to the base of the tower.

<sup>82</sup> Corona discharge is the leakage of electric current into the air around high voltage conductors. A corona shield is a disc of conductive material designed to absorb the destructive corona discharge and protect the attachment hardware.

## **IX. INSPECTION AND PATROL OF THE CARIBOU-PALERMO LINE**

Based upon PG&E records and flight records obtained from their contracted helicopter company, the evidence established inspections and patrols of the Caribou-Palermo line did not comply with the standards set forth in the ETPM and did not meet the requirements of the law or the regulatory agencies.

Routine inspection and patrol records for the Caribou-Palermo line were obtained back to 2001. According to PG&E, no inspection or patrol records prior to 2001 could be located. Based upon the inspection and patrol records the evidence established that the Caribou-Palermo line was subjected to “Detailed Ground Inspections” in 2001, 2003, 2005, 2009 and 2014. Based upon the inspection and patrol records the evidence established the Caribou-Palermo line was subjected to “Annual Aerial Patrols” in 2001, 2002, 2004, 2006-2008, 2010-2013, 2015-2018. There is no record of any climbing inspections, detailed ground inspections above 10’ or aerial inspections conducted on the Caribou-Big Bend section of the transmission line. All of the inspection and patrol records were reviewed and all of the troublemen/linemen who conducted the inspections and patrols were interviewed.

Because it was the last “Detailed Ground Inspection” of the Caribou-Palermo line prior to the Camp Fire, the 2014 Detailed Ground Inspection became a focus of the investigation. The 2014 Detailed Ground Inspection was memorialized in a 60-page “Report” which included an “Operational Control Ticket,” a “Transmission Line Data Inspection Sheet,” a “Priors” list<sup>83</sup> and a “Transmission Object List.”<sup>84</sup> According to the report, the detailed ground inspection was completed between August 5, 2014 and August 13, 2014 by a troubleman and a lineman. Four issues that necessitated the creation of a Corrective Work Form were documented in the report: flashed insulator bells were found on tower numbers 21/180A, 26/215 and 16/129 and a broken insulator bell was observed on tower number 27/226. The report was signed by both the troubleman and the lineman on August 28, 2014 and the Transmission Line Supervisor on September 3, 2014. The evidence established that the lineman was assigned to “assist” with the inspection because the troubleman, who was nearing retirement, was no longer physically able to hike/climb to many of the towers on the Caribou-Big Bend section of the line. The evidence also established that the troubleman and lineman were also assigned to take line clearance measurements (which included date, time and air temperature) at pre-determined intervals along the transmission line to determine compliance with new NERC clearance guidelines.

The 2014 Detailed Ground Inspection Report was subjected to intense scrutiny. PG&E records, including troubleman and lineman daily timecards, were obtained for comparison against the report. The evidence established the following:

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<sup>83</sup> A list of previously documented issues pending an open corrective work form.

<sup>84</sup> The Transmission Object List lists every structure on the transmission line. In 2014 each structure was identified by its tower number, a SAP equipment ID number, a physical description of the structure and the GPS coordinates for the structure. For each structure the list has an Inspection Result section in which the QCR checks the applicable box and a notes section for the QCR to write any notes about the structure or record any problems/issues/defects observed.

- 1) The detailed ground inspection started on July 24, 2014 and ended on August 27, 2014. Although the report states that the physical inspection of the Caribou-Palermo occurred on August 5, 6, 7, 13, and 14; emails, records and interviews established that an unknown, and undocumented number of towers was inspected on August 27.
- 2) In addition to the troubleman and lineman, four linemen whose names do not appear in the report assisted with the inspections on August 27, 2014. According to emails and helicopter records, prior to August 27, 2014, the Transmission Line Supervisor scheduled a helicopter to fly the lineman to difficult to reach towers. Four additional lineman were assigned to assist with inspections on August 27, 2014. No records indicate which towers were inspected on August 27, 2014 and which lineman inspected which tower.
- 3) The allotted time<sup>85</sup> for the 2014 Caribou-Palermo Detailed Ground Inspection was 89.5 hours. Based upon time cards, 121 hours were initially billed to the Caribou-Palermo Detailed Ground Inspection. After the inspection was complete, a secretary changed billing records to re-assign hours billed to the inspection of the Caribou-Palermo line to lower the total hours billed to the Caribou-Palermo Detailed Ground Inspection to 91 hours.
- 4) The lineman assigned to assist with the 2014 Detailed Ground Inspection of the Caribou-Palermo line had previously completed some troubleman training but focused mainly on “Switching.” The lineman did not recall receiving any training on performing inspections and patrols other than informal training by troublemen. No evidence was found to establish the four other linemen who performed inspections had previously completed any training on inspection and patrol. Additionally, the evidence established the lineman did not complete his inspections under the supervision of the troubleman. The evidence established that the troubleman divided the Caribou-Palermo line between himself and the lineman, and each conducted an independent inspection of the towers in the assigned section. The lineman was assigned to inspect the Caribou-Big Bend section of the line.
- 5) Recall the six steel towers numbered 22/187 through 23/192 ceased to exist in December 2012 due to the catastrophic failure and were replaced by a “Shoe Fly” consisting of 15 wood poles in January 2013 until the towers were permanently replaced in 2016. However, according to this 2014 report, those missing towers were physically inspected in August 2014, including a previously documented issue on tower 22/188. The previously documented issue on Tower 22/188 was the replacement of the parallel groove connectors identified during the 2009 Detailed Ground Inspection.
- 6) The lineman assigned to assist with the 2014 Detailed Ground Inspection of the Caribou-Palermo line was not trained to complete the ground clearance

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<sup>85</sup> The amount of time budgeted for each inspection/patrol. See section VI – “Reduction of Unit Costs for Inspections and Patrols” and subsection A – Expense Budget of section XI – “Budgetary Considerations”

measurements. According to PG&E policy, clearance measurements must include the measurement, and the date, time and air temperature when the measurement was taken. Although the report shows the clearance measurements were done concurrently with the inspection, the evidence established they were not. The lineman said he was not initially instructed to perform the clearance measurements and did not do so during his initial inspection. He went on to say it was not until after he had completed his inspection of the Caribou-Big Bend section of the line and submitted his report that he was told to perform clearance measurements. He stated he was ordered<sup>86</sup> to return to the field and perform the clearance measurements. He stated he was not initially told he needed to record the time of each measurement. According to the lineman, he returned to the Caribou-Big Bend Section of the line with the "Transmission Object List" and obtained the measurements. He stated he then added the measurements and air temperature to the already completed "Transmission Objects List." He then submitted his report a second time and was informed of the requirement to record the time of each measurement. He said that he then estimated the time he had taken the measurements and added those time estimates to his report. The result was the dates and times of the clearance measurements documented in his reports were not accurate.

Written documents clearly establish the Table Mountain Transmission Line Supervisor knew the dates inspected on the Transmission Object List were wrong. Written documents also clearly established that he knew that for some of the towers the name of the inspector conducting the inspection was wrong. The evidence also establishes he knew the line clearance measurements did not occur on the dates listed on the Transmission Object List. Despite specific knowledge the report was not accurate; the Transmission Line Supervisor approved and signed the report.

Although the investigative team did not scrutinize other patrols and inspections of the Caribou-Palermo line to the extent devoted to the 2014 Detailed Ground Inspection, similar issues were found in other inspection and patrol reports. The 2009 Detailed Ground Inspection of the Caribou-Palermo line was conducted by the same troubleman who conducted the 2014 Detailed Ground Inspection. There is evidence that a lineman, who was not mentioned or listed in the 2009 report, assisted with that inspection also.

The 2012 Annual Air Patrol Report was also found to be inaccurate. In 2012, another troubleman, was assigned to complete the patrol. According to the date-inspected line on the report, this troubleman started his patrol on August 6, 2012. The patrol was interrupted at Tower 16/130 due to "fire." The remainder of the patrol was completed by yet another troubleman. However, the report only lists the assigned troubleman and lists the "Date Inspection Completed" as August 6, 2012. In an email dated August 13, 2012 from the assigned troubleman to the Transmission Line Supervisor, the troubleman stated he would be going out on medical leave and had updated the subsequent troubleman on the "caribou-palermo partially flown on 8-6...not compl'd do to the fire in the canyon." According to the assigned troubleman, he was

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<sup>86</sup> The lineman was not clear about who ordered him.

unable to complete the patrol prior to going out of medical leave and the another troubleman completed the patrol sometime after August 21, 2012.

One former troubleman admitted he did not like flying the Feather River Canyon transmission lines and, whenever possible, assigned an available lineman to complete the routine air patrols. According to the former troubleman, after the lineman completed the air patrol the troubleman would use the lineman's notes to complete the patrol report and submit the report as if the former troubleman had personally completed the patrol.

The evidence also established during the 2013 and 2015 Annual Aerial Patrols of the Caribou-Palermo line, which were completed by different troublemen, towers 22/187 through 23/192, which ceased to exist in December 2012, were "inspected" and the pre-existing condition (parallel groove connectors) on Tower 22/188 was checked.

The inspection and patrol records clearly established that between 2001 and 2018 aerial patrol by helicopter was the primary method of inspection and patrol for the Caribou-Palermo line. As such, the thoroughness of aerial patrols of the Caribou-Palermo line was examined closely. The evidence established the thoroughness of the aerial patrols declined through the years.

Troublemen assigned to inspect the Caribou-Palermo line from 1987 through 2018 were interviewed regarding the thoroughness of air patrols. A former troubleman who conducted air patrols prior to 2001, described helicopter patrols of the Caribou-Palermo line as taking one to one and half days. One former troubleman explained his protocol for aerial patrols included instructing the pilot to fly low enough and slow enough that the troubleman could step out onto a tower if necessary. On a report of the 2001 Annual Air Patrol was a handwritten note "10 hrs." According to the former troubleman who performed the 2001 air patrol, 10 hours was the approximate flight time for the patrol of the Caribou-Palermo line.

During the investigation, helicopter flight records from 2011 through 2018 for Caribou-Palermo line aerial patrols were obtained from a local helicopter company contracted by PG&E to assist with aerial patrols. According to that company, flight records and billing records prior to 2011 no longer existed.

In 2011, flight records document 3.2 hours for the aerial patrol of the Caribou-Palermo line. In 2012, the aerial patrol of the Caribou-Palermo line was interrupted by fire and complete records for the patrol were not located.<sup>87</sup> In 2013, a troubleman completed aerial patrols of the Caribou-Palermo line, Caribou-Westwood and Palermo-Pease transmission lines (990 total structures) in 7.6 hours. In 2015, a troubleman completed the aerial patrols of the Caribou-Palermo line, Cresta-Rio Oso, Oroville-Thermalito-Table Mt #1, Oroville-Thermalito-Table Mt #3, Oroville-Table Mt (CDWR), Hamilton Branch-Chester, Collins Pine Tap and Palermo-Pease transmission lines (1,430 total structures) in 6.1 hours. In 2016, a troubleman completed the aerial patrols of the Caribou-Palermo line, Grizzly Tap, Cresta-Rio Oso, Butte Valley-Caribou and Plumas Sierra Tap transmission lines (1050 total structures) in 6.8 hours. In 2017, a troubleman completed the aerial patrols of the Caribou-Palermo line, Butt Valley-Caribou and Hamilton Branch-Chester transmission lines (813 total structures) in 4.9 hours. In 2018, a troubleman completed the aerial

patrols of the Caribou-Palermo line, Grizzly Tap, Grizzly Tap SVP, Plumas-Sierra Tap, Butt Valley-Caribou and Caribou #2 transmission lines (1708 total structures) in 5.7 hours.

A retired PG&E employee, who spent over 30 years in the Electrical Transmission Division reviewed the flight records. This former employee had been involved in the drafting of the 1995 inspection policy memo and the ETPM and the troublemen training program from 1995 to 2005. This former employee stated the flight records reflected the aerial patrols are "fly bys" not patrols or inspections. One recently retired troubleman admitted when doing aerial patrols he was only confirming the structures and components were "standing upright".

All of the troublemen who performed aerial patrols on the Caribou-Palermo line since 2012 and the current Transmission Line Supervisor assigned to Table Mt. Headquarters, were shown photographs, both the January 31, 2019 BCDA photographs and PG&E WSIP<sup>88</sup> photographs, of worn C hooks and hanger holes. All of the troublemen consistently denied it was possible to see and assess the wear on the C-hooks and hanger holes during aerial patrols.<sup>89</sup> The Transmission Line Supervisor asserted that, based upon wind and topography, it was not safe for the helicopters to fly low enough and slow enough to enable the troublemen to see and assess the C-hooks and hanger holes. The troublemen also denied it was possible to assess the wear on the C hooks and hanger holes during a detailed ground inspection. The ETPM corroborates the troublemen on both. According to Table 2 in section 1 of the ETPM the best view positions for assessing insulators and hardware do not include ground inspections nor aerial patrols. Only climbing inspections or lifted bucket inspections above 10 feet in the air would give the appropriate best view for assessment of insulators and their connectors.

Since the enactment of the ES Guideline E-TSL-G013 in 1995, **climbing inspections have only occurred "as triggered."** The specific language regarding triggers has changed very little since 1995. Appropriate "triggers" for climbing inspections were covered in section 2.1.3 of the ETPM (emphasis added):

**Triggers are specific conditions that require follow-up inspections and/or maintenance scheduled by the supervisor, independent of the routine schedule.**

The following triggers can be applied to one unit of inspection or many units, either grouped or spread over a line section/area:

- **Component defects identified by inspection**
- **Component failure (including failure in like components)**
- **Components proven defective by testing**
- **Wire/structure strike**
- **Burned area or high fire hazard**
- **Failures caused by natural disaster or storm**
- Third-party observations and complaints
- Marginal capability components of a re-rated line section

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<sup>88</sup> Wildfire Safety Inspection Program – an “enhanced” post Camp Fire inspection of all PG&E electric transmission structures. See section X – Comparison of Caribou-Palermo With Other Transmission Lines for details on the WSIP and analysis of WSIP results.

<sup>89</sup> All of the troublemen also denied knowing the sizes of the hanger holes and C hooks. Therefore, even if the troublemen had looked at the C hooks and hanger holes, without knowledge as to their respective sizes, the troublemen would not have been able to assess wear.

- Known, recurring conditions that jeopardize line integrity
- Suspected vegetation clearances less than required or less than legal vegetation clearances, or concerns about fast growth of vegetation

Despite the facially mandatory language, “specific conditions that require,” many PG&E employees who were interviewed, including electric transmission troublemen, linemen and support personnel expressed an understanding that an occurrence or discovery of a specific condition did not necessarily trigger climbing inspections. The evidence clearly established that on the Caribou-Palermo line, PG&E interpreted the mandate of “require” as discretionary. The maintenance/repair/replacement records established that since 2007 many of the “required” triggers occurred. Some of the triggers (e.g. failures caused by storm, fires under the transmission line) have occurred multiple times. The evidence established the following triggers documented in PG&E records between 2007 and 2018:

- 2008 Lightning Complex fires (burned under and around transmission line)
- 2008 Rock Fire (started by failure of connector on Caribou-Palermo line Tower 11/87)
- 10/17/08 - failure to underarm jumper
- 2009 identification of parallel groove connectors on 83 towers (defective components)
- 2009 ATS Lab Test Report identifying defects in installation of parallel groove connectors
- 2012 fire which caused delay of 2012 Annual Air Patrol
- 2012 tower collapse (defective component)
- 1/10/14 - Unknown Failure/Locked Out causing interruption, no cause determined
- 2/7/15 – storm damage
- 12/10/15 Sustained outage. Found center phase guy wire tie down broken. North phase top insulator unpinned @ structure 23/194.
- 10/19/16 failure of a J hook in structure 11/99.
- 1/9/17 Storm related emergency due to (6) lockouts on the Caribou Palermo line. Non-routine air due to line locked out, crew found problem of floating center phase conductor at tower 24/200.
- 1/10/17 storm damage, conductor repaired.
- 2/1/17 storm related interruptions. “Non-routine airs due to momentary outages, fault location 10/79, found hold insulator hold down parted at structures 8/67 and 11/89, will create notifications for repairs.”
- 2/21/17 “Non-routine air patrol due to strom related momentarys [sic]. After several relays GCC placed non-test on line and line went to lock-out.” “Per [Troubleman] on 2/21/17 during storm damage: Air patroled [sic]fault area and found hardware loose on tower 3/28 but not sure if this was part of the problem, re-energized line and held.”
- 3/2/18 “Investigate relay that occurred on 3/1/18 @11:43. Found damaged insulator on structure 37/301. Created notification to replace insulators.”

Between January 1, 2017 and February 21, 2017 there were at least nine documented storm related interruptions on the Caribou-Palermo line and at least six equipment failures. Based upon the evidence neither the individual events nor the cumulative events were deemed sufficient to trigger climbing inspections on the Caribou-Palermo line.

Although several PG&E transmission line employees referred to the ETPM as “The Bible” and asserted strict compliance with the standards and policies of the ETPM, the totality of the evidence shows that on the Caribou-Palermo line, the ETPM was not followed. Because PG&E had inexperienced, untrained and uninformed personnel conducting inspections and patrols under unrealistic time constraints, the inspections and patrols did not spot defects and wear.

On June 26, 2018, a PG&E work order requiring climbing inspections of all Caribou-Palermo line structures was issued by a PG&E Tower Department supervisor. The supervisor was interviewed. The supervisor could not provide any reason or rationale for the work order. Specifically, the supervisor stated that the work order was requested by someone else and his job was simply to compile the information into a template report and forward the template report to the appropriate work group.

PG&E was unable to provide any further information. “PG&E’s inspection records do not identify the factors that led to the selection of the Caribou Palermo 115 kV Transmission Line as one of the lines selected for climbing inspections as part of this effort. PG&E understands that the age of lines was a factor that was considered in their selection.”<sup>90</sup>

Beginning in September 2018 climbing crews from the PG&E Tower Department climbed and inspected 80 towers on the Caribou-Palermo line. The vast majority of the towers climbed and inspected were on the Palermo-Big Bend section of the Caribou-Palermo line. “PG&E understands that the reason these approximately 80 towers were selected first and the order in which they were inspected was determined by the Tower Department based on various considerations, including weather conditions and crew availability.”<sup>91</sup>

All of the towers climbed in September and October 2018 were subjected to WSIP enhanced inspection starting in December 2018. The WSIP enhanced inspections documented problems and defects on numerous towers that were not discovered/detected/document during the September 2018 climbing inspections.

The fact that PG&E has no explanation for how or why or by whom the decision to conduct climbing inspections was made is disturbing but not unusual. Numerous decisions and policies were investigated. As to many decisions and policies, PG&E was unable to provide any documentation as to who made the decision, how the decision was made and upon what the decision was based. This inability to determine who made decisions and upon what those decisions were based, frustrated efforts to identify individuals potentially personally liable for policies that lead to the conditions which caused the Camp Fire.

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<sup>90</sup> PG&E written response to CPUC Data Request 008, Question 1.

<sup>91</sup> PG&E written response to CPUC Data Request 008, Question 1.

## **X. COMPARISON OF CARIBOU-PALERMO WITH OTHER TRANSMISSION LINES**

Although the undetected problems on the Caribou-Palermo line were bad, the evidence established that the Caribou-Palermo line was only marginally worse than other comparison transmission lines. Records from post-Camp Fire enhanced inspections of other, similar lines clearly established PG&E's problems were systemic as opposed to local.

The evidence established by early afternoon on November 8, 2018, a PG&E troubleman on an emergency air patrol of the Caribou-Palermo line had identified and photographed the equipment failure on Tower 27/222. Within six days PG&E initiated climbing inspections of the Caribou-Palermo line and other similar transmission lines. The initial inspections were named the "Nine Lines Inspections."<sup>92</sup> PG&E records established that by November 14, 2018 the inspections were underway. The evidence showed the inspectors were specifically focused on C hook and hanger hole wear. By early December the Nine Lines Inspection program was superseded by the Wildfire Safety Inspection Program (WSIP). The WSIP involved enhanced (climbing and drone) inspections of all electrical transmission lines within higher wildfire risk areas. The WSIP inspections "identified thousands of conditions requiring repairs on PG&E's system that had not been previously identified."<sup>93</sup>

As a result of the WSIP, and at the request of the CPUC, an independent engineering company named Exponent was retained to review the data from the WSIP. According to its website "Exponent is a multi-disciplinary engineering and scientific consulting firm that brings together more than 90 different disciplines to solve engineering, science, regulatory and business issues facing our clients." Based upon historical records, Exponent has a longstanding relationship with the CPUC and has conducted failure analysis investigations of previous PG&E incidents.

According to interviews with Dr. Brad James, PhD in Metallurgical Engineering and Failure Analysis expert at Exponent, Exponent was tasked to confirm whether the Caribou-Palermo line had significantly more repair tags when compared to other lines and to discover the reasons behind the high volume of high priority repair tags.

Exponent published its final report, entitled "PG&E Caribou-Palermo Asset Condition Investigation" to PG&E and the CPUC on November 1, 2019. A copy of the report was obtained via Grand Jury Subpoena.

According to the Exponent report the comparison lines were chosen from a list of transmission lines based on four criteria:

- 115 or 230kV lines only
- Elevations greater than 1,000 feet
- Single circuit steel lattice towers
- Tier 2 or Tier 3 fire zones

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<sup>92</sup> The nine lines were identified as the Caribou-Palermo line, the Drum-Rio Oso #1 line, the Pitt #1-Cottonwood line, the Caribou #2 line, the Caribou-Plumas Jct line, the Colgate-Alleghany line, the Fulton-Hopland line, the Hat Creek #1-Westwood line and the Keswick-Trinity line.

<sup>93</sup> CPUC Data Request: SED-007, Response to Question 6.

Other criteria that were also applied included mountainous terrain and wind exposure. Based upon the criteria only transmission lines in running through low population, rural areas were chosen. There were no transmission lines from the Bay Area, Central Valley or central coast chosen for comparison.

Among the conclusions reached by Exponent are the following:

- The Caribou-Palermo line was confirmed to have greater post–Camp Fire high-priority (“A” + “B”) repair tag<sup>94</sup> counts than all selected comparison lines, as well as an increased per-structure high-priority tag rate when normalized<sup>95</sup> for the number of steel lattice towers.
- Other lines adjacent to Caribou-Palermo line such as Bucks Creek–Rock Creek–Cresta (BCRC), Cresta–Rio Oso (CRO), and Paradise–Table Mountain (PTM) had the second, fourth, and fifth highest post–Camp Fire high-priority tag counts, respectively, when normalized for steel lattice towers. Pit #4 Tap (P4T) had the third highest normalized high-priority tag count. It is not near Caribou-Palermo line.
- Wear was the most commonly observed post–Camp Fire damage mechanism for Caribou-Palermo line “A” tags and second most commonly observed damage mechanism for “B” tags. Nearly all Caribou-Palermo line wear-related tags were associated with cold-end hardware. Cold-end hardware wear issues were likely caused by repeated conductor and insulator movement over time.
- Caribou-Palermo line, BCRC, and CRO lines, each located within the North Fork Feather River Canyon, exhibited high-priority cold-end hardware wear tag counts more than three times higher than the next highest comparison line when normalized for steel lattice towers.
- Caribou-Palermo North experiences higher annual average wind speeds than non-adjacent comparison lines. Lines analyzed within the North Fork Feather River Canyon may have increased wear tag rates associated with longer-duration high-wind conditions. No apparent correlation between wear tags and temperature, precipitation, or peak wind speed (50-year return) was observed.
- From 2001 to November 2018, the Caribou-Palermo line was subjected to similar ground inspection and patrol frequencies as comparison lines. These inspections and patrols yielded comparable normalized high-priority tag counts between Caribou-Palermo line and comparison lines.

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<sup>94</sup> A report that documents a problem found, assigns a priority code to that problem and requests repair/replacement. PG&E Corrective Work Forms (CWF) are commonly referred to as tags. CWFs/tags are also referred to as notifications, especially in Transmission Asset Management.

<sup>95</sup> Normalization is a statistical analysis used for comparison purposes. Exponent divided the number of tags on a transmission line by the number of towers in the transmission line in order to compare transmission lines with disparate numbers of towers.

- The Caribou-Palermo line had more normalized equipment-based outages between 2007 and 2018 than approximately 80 percent of the other WSIP transmission lines.
- Caribou-Palermo line and other North Fork Feather River Canyon lines appear to have a unique set of factors that contributed to increased rates of high-priority cold-end hardware tags relative to other comparison lines. Factors such as design (link connectors and a relatively large number of non-tensioned insulated conductors), long-duration exposure to higher winds, age, and historical inspection methodologies likely all contributed to these cold-end hardware wear issues.

Although Exponent did not complete a forensic root cause analysis of the C hook that failed on Tower 27/222, when questioned Dr. James stated “That said, things like wear, things like fatigue do have a time component because the more times you rub that metal against each other, the more chance you have to – create wear. The more times you cyclically load the spring in your garage door, the longer you do that, the more chance you are going to initiate a fatigue crack and eventually grow it.”

The Exponent report analyzed historical (2001-2018) high priority tags<sup>96</sup>. Consistent with the statements of the troublemen and linemen who have completed all inspections and patrols on the Caribou-Palermo line, Exponent found no high priority tags for cold end attachment hardware wear. Exponent also examined historical (2001-2018) inspection and patrol records for all of the comparison transmission lines. Exponent did not find any high priority tags for cold end attachment hardware on any of the comparison lines. This evidence established that the local Table Mountain District troublemen and linemen were not doing less than the troublemen and linemen assigned to other districts involved in the study.

Although the primary focus was cold end attachment hardware wear, the Exponent report also analyzed all Priority A and B “tags” generated by the WSIP. Priority A and B tags were “binned”<sup>97</sup> by component type and damage mode.

Organized by component type, on the Caribou-Palermo line there were actually more tags (all Priority B) generated for “Foundation” issues than “Cold End Hardware.” There were also tags generated for steel frame issues, insulator issues and conductor issues.

Organized by damage mode, there were more tags generated on the Caribou-Palermo line for soil movement (associated with foundation) than wear (exclusively associated with cold end attachment hardware). The other damage mode tags included bent, loose, missing, broken and corrosion.

The fact the troublemen and linemen missed that tower foundations were buried and portions of the steel structures were bent, loose, broken or missing contradicted the assertions of PG&E

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<sup>96</sup> Issues that would be considered A or B priority under the current version of the ETPM

<sup>97</sup> In layman’s terms the tags were separated, sorted and organized by category.

employees that inspections and patrols were being conducted pursuant to the requirements of the ETPM.

Tower 27/221 best illustrates this lack of attention and thoroughness. On September 11, 2018, during the Annual Air Patrol of the Caribou-Palermo line, the troubleman noticed that a “hold down insulator anchor” on Tower 27/221 had failed. The troubleman noted the problem on his report and created a Corrective Work Form for repair of the hold down insulator anchor. On November 11, 2018, during the Camp Fire origin and cause investigation, the electrical engineer retained by Cal Fire noted and photographed the failed hold down insulator anchor on Tower 27/221. The electrical engineer also noted the arm of the transmission tower to which the hold down insulator anchor should have been attached was bent and two of the steel members of the arm were buckled. No corrective work form for the arm was located. The troubleman **only** created a corrective work form for the hold down insulator anchor. According to PG&E policy, as explained by multiple transmission troublemen, supervisors and specialists, corrective work forms are problem specific and if there are multiple problems in a tower each problem gets a separate corrective work form.

The Exponent report also compared the number of post-Camp Fire A and B tags with the comparison lines. Except for tags related to foundation issues, Exponent did not separate and organize the tags from the comparison lines. According to the Exponent report there were previously undocumented issues on all of the comparison lines. The only reasonable conclusion to be drawn from this data is that inspections and patrols on other lines are only marginally more thorough than those done on the Caribou-Palermo line. This conclusion was corroborated by Exponent’s comparison of A and B tags across maintenance districts. According to the Exponent report the post Camp Fire normalized A and B tags for comparison lines in the Table Mountain maintenance district (referred to as Table Mountain Headquarters by PG&E personnel) were not inconsistent with those of comparison lines in the Sacramento and Lakeville maintenance districts.

Based upon the totality of the evidence regarding the ETPM and inspections and patrols the only reasonable conclusion to be drawn was the Caribou-Palermo line specifically and the Table Mountain District in general are not outliers. The evidence established the lack of thorough inspections and patrols on the Caribou-Palermo line was a systemic problem not a local problem. Based upon the evidence the only reasonable conclusion was that in low population density mountainous areas, the PG&E Electrical Transmission Division was not following the standards and procedures established by the ETPM. As a result in those areas PG&E was not complying with the standards and procedures submitted to the regulatory agencies and required by regulation.

## **XI. BUDGETARY CONSIDERATIONS**

Financial records from 2007 through 2018 obtained from PG&E, the CPUC and FERC clearly established PG&E had consistently increased its budget for maintenance, repair and replacement of transmission assets<sup>98</sup>. The central issue in the FERC litigation over PG&E’s 2018 Transmission Owner’s Rate Case request was how that money was being spent. In the “Summary of the Prepared Rebuttal Testimony of {Vice President of Electrical Asset Management}”<sup>99</sup> then PG&E Vice President of Electrical Asset Management states: “PG&E makes these investments to address deteriorating electric system infrastructure and to address equipment that has reached the end of its useful life and system designs that no longer meet operational requirements.” The PG&E Senior Director, Transmission Asset Management at the time, also provided testimony in the FERC litigation. In the “Rebuttal Testimony of {Senior Director, Transmission Asset Management}”<sup>100</sup> it was stated:

“PG&E must repair or replace assets that are approaching the end of their service lives, that are deteriorating, or that have failed. Replacement and repair of PG&E’s assets are essential to maintaining and improving PG&E’s transmission service to its customers. PG&E expects that replacement-related capital work will continue to grow as PG&E’s assets continue to age. A significant part of PG&E’s transmission infrastructure was constructed in the years following World War II, with some assets being even older. In addition, PG&E has one of the largest investor-owned fleet of hydroelectric facilities in the Country. By and large, these facilities are located remotely from PG&E’s load centers. Many of these facilities—and their related transmission assets—were constructed in the early 1900s. Due to an increasingly large number of these assets nearing the end of their useful service lives, capital investment will shift significantly, from capacity increase-related projects, to lifecycle replacement projects.”

However, the evidence gathered during the Camp Fire Investigation contradicted the FERC testimony of both Vice President of Electrical Asset Management and Senior Director, Transmission Asset Management. PG&E was **not** using the money to replace the oldest and most deteriorated transmission assets.

Because of limited available resources, the investigation was unable to fully analyze PG&E’s financial records and assumed all figures were correct. The investigation instead focused on how, where and why the money was being spent. The evidence established the maintenance/repair/replace budget was primarily based upon “reliability metrics<sup>101</sup>.”

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<sup>98</sup> During litigation relating to PG&E’s 2018 Transmission Owner Tariff (TO18) rate case, PG&E represented that from 2007 (\$405,739,000) through 2016 (\$1,124,457,000) electrical capital expenditures increased every year except 2013 (decreased app. \$20,000,000 from 2012) and 2016 (decreased app. \$7,000,000 from 2015). In total, spending increased \$734,812,000 between 2007 and 2015 (the high spending mark), or an average of \$81,645,777 per year.

<sup>99</sup> Exhibit PGE-0037, FERC Docket No. ER16-2320-002.

<sup>100</sup> Exhibit PGE-0038

<sup>101</sup> Reliability metrics measure how often a power line is out of operation, how long it is out of operation and how many customers are affected by that outage. SAIDI, SAIFI, CAIDI, ACOF and ACOD were the performance metrics used.

The evidence established PG&E electrical transmission expenditures were divided into two budget categories: 1) capital and 2) expense. The capital budget for the electric transmission division of PG&E was funded through customer rates which were determined by FERC “rate cases.<sup>102</sup>” The expense budget was funded by the company. Any money spent on the expense budget potentially reduced the amount of profit of the company. In general, inspection, patrol and maintenance of electrical transmission assets were paid from the expense budget.

Replacement of electrical transmission assets was paid from the capital budget. FERC rate cases, and PG&E’s future capital budgets, were based upon PG&E’s projections of capital projects. The evidence established that, for budget purposes, all components of the electrical transmission system were considered “assets.”

#### **A. Expense Budget**

Based upon PG&E internal records and interviews of electrical transmission employees, including a former employee of the PG&E Business Finance Department, it was established the budget for inspection and patrol of the transmission lines was controlled by the Business Finance Department. Each year the Business Finance Department set an inspection and patrol budget for each of the PG&E transmission maintenance divisions. That budget was based upon the allotted time for all of the inspections and patrols scheduled for that year. The allotted time for each inspection and patrol was based upon the specific time allotted for a troubleman to spend on a single structure (e.g. tower or pole). To compute the time allotment for a transmission line, the single-structure time-allotment was multiplied by the number of structures in the transmission line.

The time allotted to be spent on a single structure was a system-wide constant and did not take into account the physical location of any specific structure or the amount of time necessary to travel from structure to structure. For example, the time allotment assumed the inspection of a tower on the Caribou-Palermo line, parts of which could be accessed only by hiking a steep trail, would take the same amount of time as inspecting a tower in the Central Valley, located directly adjacent to a public roadway.

When questioned about the time allotments for inspections and patrols, a former employee of the Business Finance Department who was intimately involved in the allotment process, admitted he had no knowledge or experience with inspections and patrols, and based the allotments solely on dividing up the overall electric transmission expense budget. This former employee also asserted the Transmission Line Supervisors and Superintendents were consulted regarding the proposed allotments. The Transmission Line Supervisors and Superintendents interviewed denied having any input or control over the time allotted for inspections and patrols.

Although denied by the involved employees, emails between the Table Mountain Headquarters secretary and several troublemen indicated the troublemen were not able to complete some

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<sup>102</sup> A rate case is the utility’s explanation and justification for a rate increase. In layman’s terms, the utility lists all of the capital projects the utility deems necessary and their projected costs. If the total cost of all of the projects is higher than the projected amount to be collected from customers, the utility requests a rate increase and files a rate case. The rate increase is based upon the difference between projected costs and projected collections from customers. The rates which PG&E is allowed to charge customers includes a profit margin defined by FERC.

inspections in the time allotted. For example, the 2014 Detailed Ground Inspection of the Caribou-Palermo line was allotted 89.5 hours. PG&E records showed, before the secretary reassigned hours billed by the troubleman to other projects, that the troubleman and five linemen actually spent 121 hours completing the inspection. When asked, a former Transmission Line supervisor asserted that because of the artificially constrained budget, his district was constantly under pressure to limit the hours necessary to complete thorough inspections and patrols of transmission lines.

During this same time period internal PG&E emails indicate the expense budget for electrical transmission was being reduced. An October 2015 email noted: “For the overhead tower inspections, I don’t think we would be able to do any repairs and incur land costs shown in item three and four in 2015.” The email includes a chart of projects with the 2015 and proposed 2016 budgets. Item three in the chart is “Severe deterioration repair (tower department).”

In an August 2016 email regarding a transmission expense budget meeting from a manager in Business Finance to a Senior Director of Transmission Lines, it was stated: “The purpose of the meeting is to obtain Leadership guidance on *which* items to pursue and *when*. This input is important given the Expense reduction pressures being pushed down on Transmission Operations for 2017.” One of the people involved invited to this meeting was the former Business Finance employee assigned to track unit costs for the transmission inspection and patrol budgets. When questioned by investigators, the former Business Finance employee conceded one way to reduce budget for inspections and patrols is to reduce the unit cost. According to the employee, the unit cost is reduced by reducing the time allotted for inspection/patrol of each transmission asset.

During this same time period, internal PG&E documents establish the “T Lines Patrols and Inspection Continuous Improvement Charter” was formed. The T Lines Patrols and Inspection Continuous Improvement Charter was a committee made up of PG&E personnel from the transmission line division, asset management, asset strategy and business finance. One of the specific mandates of the committee was evaluation of the feasibility of reducing costs by changing the frequency of inspections and patrols or finding more efficient work practices.

Based upon the totality of the evidence, specifically the reductions in times allotted for patrol and inspection, the internal emails indicating budget reductions and the formation of a committee to investigate reducing patrol and inspection costs, the only reasonable conclusion was that PG&E achieved expense budget cost savings by reducing the thoroughness of inspections and patrols.

PG&E also reduced its expense budget by charging expense projects to the capital budget. Moving projects from the expense budget benefits PG&E in two ways. First, every expense budget dollar saved was an additional dollar of potential profit. Second, the customers (ratepayers) pay over 100% of each dollar spent on capital improvements that brings in additional profit. Based upon internal emails and interviews with engineers involved in the planning and management of transmission projects, it was common for PG&E to look for ways to bootstrap expense budget projects on to capital budgets projects. Hypothetically, for example, instead of paying \$1000 from the expense budget to fix a component, PG&E would pay \$10,000

from the capital budget to replace the component. The \$1,000 saved from the expense budget becomes profit and the company charges the customers \$10,500<sup>103</sup> for capital improvement of the component.

The evidence established that PG&E personnel were consistently looking for ways charge expense budget projects to the capital budget. In a 2018 email from a PG&E civil engineer to a supervisor in the Transmission Line Asset Strategy Department of Transmission Asset Management, the civil engineer wrote:

“I understand Asset Strategy has been working on a new way to define unit of capital to make it easier to capitalize a partial replacement on tower sections (e.g. footing, crossarm, etc...). We are replacing the top part of a distorted tower under emergency and was wondering if that could be considered a unit of capital and capitalize the project for corporate accounting purposes.”

Based upon interviews with various PG&E personnel it was established that PG&E, as is common with large companies, had developed company accounting rules. Application of these rules determines if a project is charged to the expense budget or the capital budget. In general the rules hold that maintenance and repair are paid from the expense budget and replacement is paid from the capital budget. The above email indicates a move within PG&E to blur the lines between repair and replace to allow some repairs to be charged to the capital budget.

Another example occurred after the cancellation of the 2007 project to relocate ten deteriorating towers on the Caribou-Palermo line. The original Advance Authorization (AA) requested \$800,000. Only \$200,000 was approved. Once the project moved forward, the \$200,000 budget was quickly surpassed. By the time the project was cancelled in 2009 almost \$800,000 had been spent. A portion of that money was spent constructing an access road along the proposed new route of the ten new towers. According to internal emails obtained, the money spent to construct the new access road was charged as a capital improvement on another, adjacent transmission line. According to the former PG&E Director of Electric Asset Strategy who approved the 2007 AA, the rest of the money spent on the canceled project should have been charged to the expense budget. Internal emails establish that PG&E made an effort to find ways to charge the remainder of the money spent on the canceled project to the capital budget. A 2013 email from the former Maintenance and Construction Engineer (M&C) Engineer in charge of the project stated:

“Looks like we will be forced into trying to Capture the \$650K+- that has been spent on the now canceled project for relocating Towers 6/53 to 7/65 from the non-accessible River side to Hwy side that (Project Manager) was managing.

In order to not have to Expense the dollars spent we will be required to perform the following work.”

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<sup>103</sup> The extra \$500 added to the \$10,000 is the FERC allowed profit margin that PG&E would charge on capital improvements.

The email goes on to list the proposed work which mainly consisted of replacing insulators on the towers that Maintenance and Construction Engineer had previously described in the Advance Authorization as deteriorated. The work did not include replacement of the deteriorated conductor (annealed and parting) or any of the deteriorated hardware.

In a subsequent, 2014 email regarding the canceled project, the former M&C Engineer stated:

“In order to try and capture the \$900K that was spent for nothing, Asset Management decided that we would just replace the Insulators and Hardware on the section of towers that were initially going to be relocated.”

In a 2016 email regarding the canceled project the former M&C Engineer stated:

“This work was deemed by *{the Sr. Director of Transmission Asset Management}* in order not to end up expensing \$800,000 that was spent by *{Project Manager}* on an original job started by *{former Table Mountain TLine Supervisor}* to relocate this section of towers.”

When asked about these emails, the former M&C Engineer denied he was instructed to find ways to capitalize the money already spent and asserted that he was lying in the emails in order to get necessary work done quickly. As to the 2013 and 2014 emails, he stated the recipient of the emails, the Transmission Line Supervisor at Table Mountain Headquarters, distrusted engineers, so he lied and put blame on Asset Management in order to avoid argument. When asked about the 2016 email, which was directed to an engineer in Asset Management, the former M&C Engineer replied that the Sr. Director of Transmission Asset Management was not involved in the project and he invoked the name of the Sr. Director of Transmission Asset Management to speed up the process. This person is the same former M&C Engineer who wrote the original AA and the approved AA and now claims that his description of the condition of the relevant Caribou-Palermo line structures and conductor was unsupported and exaggerated for the purpose of securing funding for the project. In a 2016 email to the Transmission Line Asset Strategist, who canceled the 2007 project, the former M&C Engineer stated:

“The only thing that after reading the below that came to my mind would be to also add life expectancies on some of our older lines that we purchased from other utilities. Caribou-Palermo (old Caribou-Golden Gate) for example...Built roughly in 1907. This line is in a very remote area. Access is extremely limited. Conductor was deemed annealed several years back. Line has tons of splices in it. Some spans have 5 splices within said span. Most of the upper line section is subject to rockslides that have taken this line out in the past. Restoration time is lengthy..

Just one example, but I feel we should identify lines or line sections that meet this type of criteria and add them to our mitigation plan or part of future complete structure replacements...”

## **B. Capital Budget and Comparative Risk Analysis (RIBA)**

For the capital budget, the evidence established PG&E employed “comparative risk analysis” to determine the budgetary priority of potential capital projects. Based upon interviews with several current and former PG&E employees who were involved in risk analysis, it was established PG&E has traditionally used some form of comparative risk analysis. Comparative Risk Analysis balances the probability of risk against the probability of consequence; and depends upon accurate projections and analysis of both. One of the former employees interviewed was the former Senior Vice President of PG&E. According to the former Senior Vice President of PG&E when he arrived at PG&E in 2007 the company was using comparative risk analysis, which he disapproved because of its subjective nature<sup>104</sup>. The former Senior Vice President of PG&E tried to install an objective risk model focused solely on the probability of failure. The former Senior Vice President of PG&E left PG&E in 2011.

The evidence established in 2014 PG&E again began using comparative risk analysis for capital funding. Since 2014 PG&E has used the Risk Informed Budget Allocation (RIBA). Based upon internal documents and interviews, the evidence established that under RIBA, capital projects were evaluated for funding based upon safety, environmental and reliability impacts that were scored based upon a complex matrix. According to a Manager in Transmission Asset Management, and one of the persons actively involved in the RIBA scoring process in 2014, reliability is “more about the customer impacts. So number of customers, the duration of outages, large cities, metropolitan areas. It’s what we call critical locations. This can be anywhere from towns to cities.”

For each category (safety, reliability, environment), a project would score between 1 and 10,000. The scores for the three categories were combined with the result being a project score between 3 and 30,000. The final score, according to the Manager in Transmission Asset Management, represents the “consequence if we don’t complete the project.” Once all of the proposed projects are scored the projects are ranked high to low by total score. RIBA scoring determined whether a project that is not mandated by a regulator was funded for the coming year, RIBA scoring and ranking was independent from and occurred after a project had been included in a FERC rate case.

Based upon the evidence, projects were used in FERC rate cases to justify rate increases and then, later, not funded because of a low RIBA score.

As examples, in 2014 three proposed projects on the Caribou-Big Bend section of the Caribou-Palermo line were scored under RIBA; the TL<sup>105</sup> Relocate 10 Towers project, the Replace 5 Damaged Towers project, and the 115kV NERC Alert. Through internal documents and witnesses it was determined that the TL Relocate 10 Towers project was the 2007 project to replace and relocate the ten deteriorating towers that had been canceled in 2009. By 2014 the only portion of the project active was the replacement of insulators so that the money spent on the project prior to cancellation could be charged to the Capital Budget. Based upon internal

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<sup>104</sup> Relative risk analysis is a form of comparative risk analysis.

<sup>105</sup> TL is abbreviation for Transmission Line.

documents and witnesses, it was established that the Replace 5 Damaged Towers project referred to the replacement of the five towers that collapsed in December of 2012. Based upon internal documents and witnesses it was established that the 115kV NERC Alert project referred to the 2013 Caribou-Big Bend NERC project.

According to the “Risk scoring for baselined projects” the Replace 5 Damaged Towers total risk score was 180. The total risk score for the Replace 5 Damaged Towers project was explained in a February 2014 email from a RIBA team member<sup>106</sup> to the Senior Director of Transmission Asset Management in 2014. According to the RIBA team member:

“<200 score because there is no likely large environmental event (if structures fail, it will be likely due to heavy rain and no wildfires are possible then). Also no likely public safety issue with live wires down because it is in a remote area. Reliability score is not that high because although the likelihood of failed structures happening is high, the affected customers are likely in the order of >1K.”

According to the RIBA scoring sheet for the Replace 5 Damaged Towers project the person(s) scoring the project felt that the failure of the Shoe Fly “Probably could happen this next season.” On the “Frequency/time-to-impact taxonomy” the project scored 6 out of 7 possible points.

In 2014 the Manager in Transmission Asset Management took part in the RIBA scoring. In addition she was the “Program Manager” for the Replace 5 Damaged Towers project. Based upon the 2014 RIBA scoring records the Manager in Transmission Asset Management stated that the Replace 5 Damaged Towers project scored the lowest possible scores of 1 for safety and environmental and scored 178 for reliability. According to the Manager in Transmission Asset Management the safety score was justified because the “worst reasonable direct impact,” (WRDI) “basically in the particular case, would a structure fall down and hit somebody” was negligible because of the “remote” location of the Shoe Fly poles. According to the Manager in Transmission Asset Management, despite the written statements from 2014 documenting concern for the long term reliability of the Shoe Fly, the Shoe Fly was “temporary permanent” and it was not felt to be a danger to collapse. A former Transmission Specialist for PG&E and the person who was in charge of the construction of the Shoe Fly, was also asked about the Shoe Fly. According to the former Transmission Specialist, the Shoe Fly was only designed to be in place for a few months with the expectation that permanent replacement towers would be erected the following summer of 2013. Notes in the RIBA scoring sheet under the category reliability category of “Frequency<sup>107</sup>” corroborate the former Transmission Specialist. The former Transmission Specialist was also corroborated by an October 2013 email from the former M&C Engineer to multiple people. In the email the former M&C Engineer states “I do not believe there was a PO<sup>108</sup> created under MWC 70<sup>109</sup> yet for that replacement project that is now sitting

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<sup>106</sup> The position/job title of the RIBA team member was never determined.

<sup>107</sup> The “Frequency” category measures how often a problem is expected to occur.

<sup>108</sup> In layman’s terms, a project proposal.

<sup>109</sup> MWC is an abbreviation of Major Work Category. Each major work category is identified by a number. In this case the proposed project falls with major work category number 70. All PG&E electric transmission work projects are assigned to a major work category for accounting purposes.

on Wood poles and was not intended for long term reliability.” The project was assigned a frequency score of 6 out of 7 possible with the note “Probably could happen this next season.”

No records were ever located to support The RIBA team member’s conclusion that the Shoe Fly poles would most likely fail due to heavy rain. According to the Manager in Transmission Asset Management, The RIBA team member was an expert on the RIBA process who was assigned to assist “the engineer walk through the process.” Based upon the records the Manager in Transmission Asset Management identified the engineer as the engineer most familiar with the overall project and assigned to do the RIBA scoring for the project. According to an undated PG&E Org Chart, the engineer assigned to score the project was a Senior Engineer assigned to Transmission Asset Development and reported directly to the Manager in Transmission Asset Management. According to the notes on the scoring sheet, as interpreted by the Manager of Transmission Asset Development, “the concern here is the note says that the structures would go down during rainy and wet storm. And what’s not shown here is that the wildfire is not likely, because on the wet ground not likely to have wildfire.” No records in support of Senior Engineer’s conclusion were ever located.

On the other hand, the TL Relocate 10 Towers project scored 581. According to the scoring sheet, the Senior Engineer was also the engineer assigned to score this project. Despite the fact that by 2014 the scope of the project was limited to the replacement of insulators so that money spent on the project prior to cancellation could be charged to the Capital Budget, the project scored 18 points out of 10,000 possible points for safety<sup>110</sup>. Despite the fact that the project involves the same Caribou-Palermo line the Reliability Risk Score is 562. 434 of those points are justified because “WRDI is possible contact with public leading or to other facilities causing potential injuries to few employees” according to the notes on the scoring sheet.

The 2014 RIBA scoring is used to highlight the subjective nature of the comparative risk analysis. Because they are subjective the risk scores are easily manipulated. PG&E was highly motivated to complete the TL Relocate 10 Towers project in order to be able to charge the budget overruns, money already spent, to the capital budget. By 2014 the Replace 5 Damaged Towers project was about future spending. The best example of the manipulation is the WRDI justifications. One of the oft-stated justifications for the TL Relocate 10 Towers Project was the fact that the ten towers were located in a remote, inaccessible location. The towers were so inaccessible that PG&E had to use helicopters to fly personnel to the towers. Also, there was no evidence that any of the ten towers was on the verge of collapse according to the 2009 email from the manager who cancelled the project in 2009. On the other hand, the Shoe Fly was built on Camp Creek Road and any, or all of those poles, could reasonably be expected to fall down within a year.

Another example of manipulation of facts in the 2014 RIBA was the RIBA team member’s conclusion, apparently based upon the Senior Engineer’s scoring note that “structures would go down only if it is rainy and wet”; and restated several times by the Manager in Transmission Asset Management that the wood Shoe Fly poles would probably only collapse during heavy rain

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<sup>110</sup> 18 times the safety score for the Replace 5 Damaged Towers project

thereby minimizing the chance of a wildfire. This statement was made in 2014, in the middle of a historic drought.

PG&E's own records clearly establish wind has long been classified as one of the top causes of structure failure on both transmission and distribution lines. PG&E's own records also establish the Feather River Canyon is known for high and sometimes extreme winds. Based upon PG&E wind records, the Exponent Report stated "Maximum (or peak) wind speeds in the areas of the chosen lines are generally found to vary between 60 to 100 mph, as measured and reported in "Extreme Wind Speed Estimates Along PG&E Transmission Line Corridors" across one-minute time intervals and at an elevation of 33 feet above ground level, over a 50-year return period." According to data pulled from the Jarbo Gap RAWS<sup>111</sup> by Meteorologist Kris Kuyper the highest number of high wind events occur in the month of October.

The inherent weakness of comparative risk analysis is its subjective nature. Data can be manipulated to achieve a desired result. Based upon the evidence the 2014 RIBA process exposes the manipulation of comparative risk analysis by PG&E personnel.

### **C. Transmission Asset Management**

The examination of the 2014 RIBA scoring also highlighted the central role of Transmission Asset Management (TAM) in the development and execution of the capital budget. The former Senior Director was replaced as Senior Director of Transmission Asset Management in 2017. The Senior Director of Transmission Asset Management who assumed the position in 2017 explained the role of Transmission Asset Management:

"My team's responsibility for managing those assets would be to track performance of the operation of the assets and ultimately make recommendations for enhanced -- future enhancements for those assets, investments that would occur over the next five to ten years both to replace aging infrastructure, enhance existing infrastructure for greater operational flexibility as well as increased capacity to meet NERC reliability plan and standards."

"My job is to identify future work, future planned capital work. Our process has a bias towards identifying work approximately six years out.

In 2017, shortly after the new Senior Director of Transmission Asset Manager took over, TAM published the Electric Transmission Overhead Steel Structure Strategy Overview (2017 Strategy Overview). The document was written by a Senior Engineer assigned to Transmission Asset Strategy (TAS) within TAM. According to the Senior Engineer, the function of TAS is to review conditions reported from the field, study performance of the assets, apply criteria and develop a strategy for replacement or repair. According to the Senior Engineer the "conditions reported from the field" are the notifications/tags generated by the troublemen, linemen and towermen<sup>112</sup>. The "criteria" listed by the Senior Engineer include the age of the asset, environmental risk, safety risk, reliability risk.

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<sup>111</sup> Remote Automated Weather Station. See section XVI "Drought and Wind"

<sup>112</sup> Towermen work only on the steel structure of the tower.

According to the Senior Engineer, prior to the 2017 Strategy Overview neither a comprehensive plan for tower risk nor a tower risk database existed at PG&E. The Senior Engineer's statement was corroborated by internal emails obtained from PG&E. A June 10, 2016 email from a Manager in Transmission Line and Substation Asset Strategy<sup>113</sup>, to a group of PG&E employees including the Senior Engineer, appears to be the genesis of the 2017 Strategy Overview. This email regarded a "Comprehensive Plan for Towers." According to the text the email was follow-up to a meeting held earlier in the day. The stated goal of the meeting was "Develop a Comprehension Plan for Tower Risk with emphasis on steel corrosion risks. Plans should include maintenance plans, detail inspection specifications, repair vs. replace criteria, capital and expense cost estimates, risk database, update Standards." Based upon the evidence, the only reasonable conclusion to be drawn is that, despite the fact that PG&E decisions were allegedly based upon risk analysis, until 2017 PG&E had no consistent and comprehensive risk database or policy for evaluating risk.

According to the 2017 Strategy Overview "The Transmission Line Steel Structure strategy will manage the asset life cycle (e.g. Create, Utilize, Maintain, Renew (replace), and Dispose) based on risk. The renew asset life cycle is based on proactive cost replacements for high-risk assets. For medium risk assets, it is based on reactive replacements following asset failures." The "high risk," "medium risk" theme continues throughout the 2017 Strategy Overview. Although not mentioned in the quoted sentence, there is also a "low risk" category. The appendix to the 2017 Strategy Overview includes an "Asset One Page Summary T-Line Strategy From A PAS 55 Framework." The summary consisted of five different charts. Although she is the author of the 2017 Strategy Overview, the Senior Engineer asserted that she was not familiar with the charts and was unable to explain the charts or their significance. According to the Senior Engineer the One Page Summary was prepared by her supervisor and attached to her work. The final chart, which has no title, appeared to summarize PG&E TAM risk strategy. According to the chart, for low risk assets the strategy was "run to failure" with "minimal patrol to continuously assess risk," "no maintenance," and "only replacement no repairs." For high risk assets the strategy was "condition base and cause evaluation," "extensive patrol with more frequency," "minimum req<sup>114</sup> maintenance" and "replace/repair."

During interviews and testimony, TAM personnel stated that the high, medium and low risk categories applied to components of the transmission lines and not the entire lines. Insulators were identified as an example of a low risk component. All current TAM personnel disavowed the term "run to failure" during interviews and testimony.

Shortly after publication of the 2017 Strategy Overview PG&E published the 2018 TD-8101 – Transmission Line Overhead Asset Management Plan (2018 AMP). According to the Senior Engineer the 2018 AMP was written by multiple engineers, including herself. The "Document Owner" listed on the 2018 AMP is the Senior Director of Transmission Asset Management.

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<sup>113</sup> At the time The Senior Engineer's direct supervisor

<sup>114</sup> abbreviation of required.

The 2018 AMP included a modified version of the TAM Risk Strategy chart found in the Appendix of the 2017 Strategy Overview. According to the preface to the chart:

“The characteristics and condition of each transmission line overhead asset inform the risk and approach to replacement and operation, as well as patrol and maintenance frequency, as shown in” the charts

For low risk assets the strategy is “run to maintenance,” with “low degree of patrol with minimal frequency to continuously assess risk,” and “corrective maintenance.” For high-risk assets, the strategy is “preventative maintenance and cause evaluation,” with “high degree of patrol with more frequency,” and “preventative maintenance.” The 2018 AMP also includes a table entitled “Risk and Replacement Strategy per Asset.” The Risk and Replacement Strategy per Asset table identifies individual components of the, identifies the risk for each component and defines the replacement strategy for each component. Overhead conductor is listed as a “high to medium” risk with the replacement strategy “preventative maintenance for high risk” “run to maintenance for medium risk.” Steel structures are listed as high risk with the replacement strategy “preventative maintenance.”

The most relevant difference between the chart in the 2017 Strategy Overview and the chart in the 2018 AMP is the replacement of “Run to Failure” with “Run to Maintenance.” When asked about “Run to Failure” TAM employees tended to distance themselves from the phrase and criticize the phrase as being undefined although the term “Run to Failure” appears to be an industry standard and was discussed as an appropriate strategy for some components of the electrical transmission system in the 2010 Quanta studies. When asked to define “Run to Maintenance” most TAM employees identified failure as the trigger to maintenance. Based upon the evidence it appears that the change from failure to maintenance was semantical only.

As Senior Director of Transmission Asset Management the witness was responsible for overseeing the organization within PG&E responsible for managing assets of transmission and substation infrastructure and overseeing risk management within electrical transmission. As the manager of transmission assets, he played a sponsor role for new capital projects to replace to replace infrastructure. Transmission infrastructure was defined as transmission structures, conductor, insulators, circuit breakers, substation busses and transformers.

According to the Senior Director of Transmission Asset Management, information from the field, in the form of notifications/tags generated as a result of inspections and patrols, play a role in identifying potential projects to be included in the five year plan. According to the 2018 AMP “Transmission line overhead asset performance is primarily tracked through two factors: historical line outages and maintenance and inspection found notifications.” The Senior Director of Transmission Asset Management conceded the quality of the input received from the field has an impact on the overall asset strategy. The Senior Director of Transmission Asset Management also conceded problems not identified by field representatives would never be brought to the attention of TAM. As a result projects to repair or replace those problems would never be

planned. The Senior Director of Transmission Asset Management also conceded that as of 2018, other than the NERC Project there were no projects planned through 2022 on the Caribou-Big Bend section of the Caribou-Palermo line.

Although PG&E policy, as defined in documents like the 2017 Strategy Overview and the 2018 AMP and explained by TAM personnel, represented that decisions were made based upon a combination of performance information and patrol and inspection findings, the evidence indicated that performance information played an oversized role and patrol and inspection findings were insignificant. As a result of years of reductions of frequency and thoroughness of patrols and inspections, problems were not being identified. Based upon the WSIP and the Exponent report it was clear that on the Caribou-Palermo line and comparable lines, PG&E troublemen were not identifying problems.

The evidence established decisions regarding repair or replacement of transmission assets could not have been based upon non-existent patrol and inspection notifications. As such, then the decisions were being made solely on asset performance information. Performance information consisted of a complex series of reliability metrics (SAIDI, SAIFI, CAIDI, ACOD, ACOF). The evidence established these reliability metrics were a statistical analysis of outage data. This information was required to be tracked and reported yearly to CPUC, CA ISO, WECC, NERC and FERC. In general, all of the reliability metrics measured either the number or the effect, or both, of power outages per year. Effect is measured by either the number of customers who lose power as a result of the outage or the duration of the outage or both. The evidence established that the Caribou-Palermo line had only one dedicated customer (a powerhouse) who could be effected by an outage.

Information regarding transmission asset conditions was based upon information received from the field. This includes notifications/tags generated by troublemen, linemen and towermen during inspections and patrols, both routine and non-routine). According to the Senior Director of Transmission Asset Management, TAM relied upon notifications/tags to identify potential preventative maintenance projects. After substantial discussion the Senior Director of Transmission Asset Management conceded that the fact that if troublemen, linemen and towermen did not inspect specific components of the transmission assets, it would affect the reliability of the information upon which TAM was making decisions. Specifically he conceded that because nobody was looking for wear on cold end attachment hardware and therefor, no notifications/tags were being generated for replacement of cold end attachment hardware there were, as of November 8, 2018, no projects in the foreseeable future for the replacement of cold end attachment hardware.

Although there were no specific plans to replace cold end attachment hardware the Senior Director of Transmission Asset Management asserted that plans were being made to perform preventative maintenance on the Caribou-Palermo line. According to the Senior Director of Transmission Asset Management, the NERC Project included non-ERC required preventative maintenance on the Caribou-Palermo line. When confronted with the Project Scope document for the NERC Project the Senior Director of Transmission Asset Management was unable to identify any non-required work. According to the Senior Director of Transmission Asset

Management the non-required preventative maintenance was not included in the Project Scope document but that plans were being made to perform the preventative maintenance. However, no records or plans for any preventative maintenance projects on the Caribou-Palermo line were located through 2022.

Another concept, which came up repeatedly in interviews and testimony of TAM personnel was “bundling.” Based upon the evidence, for PG&E, bundling meant doing multiple projects on a transmission asset or line at the same time. According to the Senior Director of Transmission Asset Management TAM decisions were, in part, “informed by the most cost-effective approach for our customers.” Having crews do multiple projects at once is much more cost effective than having multiple crews make multiple visits to the asset or line. An example of bundling occurred in 2018 on the Parkway-Moraga 230kV transmission line. The line had been de-energized so that the tower department<sup>115</sup> could fix a tower. While the line was de-energized the line department<sup>116</sup> performed preventative maintenance by replacing insulators.

Bundling often involved the intertwining of capital budget and expense budget projects. Based upon internal PG&E emails and interviews with PG&E personnel, it appeared PG&E bundled expense budget projects with capital budget projects in order to charge the expense budget costs to the capital budget project.

Despite their preference for bundling projects there is no evidence of any intent to bundle any preventative maintenance projects to the 2013 NERC Alert Project.

The only reasonable conclusion to be drawn from the totality of the evidence is that PG&E was employing a run to failure strategy on the entirety of the Caribou-Big Bend section of the Caribou-Palermo line. Pursuant to the run to failure strategy, PG&E only applied a low degree or patrol with minimal frequency to continuously assess risk, and only performed corrective maintenance.

## **XII. SAFETY, RELIABILITY AND ENVIRONMENT**

The phrase “Safety, Reliability, Environment” appears consistently in PG&E documents, regulatory filings and public pronouncements. Members of the Electric Transmission Asset Management interviewed said safety, reliability and environment are the criteria by which all project decisions are judged. The Senior Director of Transmission Asset Management testified:

“In terms of how PG&E quantifies consequences, we usually categorize it in a number of areas focused on safety, impact reliability, impact to the environment are some examples.”

“An analysis starts with defining a risk event, and that's really defining what is that event that we believe could have exposure from a public safety reliability environmental standpoint, and then quantifying the potential drivers for that event, and the associated consequences for that event.”

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<sup>115</sup> The tower department deals solely with the steel transmission structures. Employees are called Towermen.

<sup>116</sup> The line department deals with energized components (conductor, insulators, hot and cold attachment hardware) of the transmission system. Employee are called Linemen.

All members of TAM were asked which of the three criteria was considered the most important. They unanimously replied safety. The evidence, however, contradicted that assertion. The evidence showed disparate treatment of transmission assets based upon the reliability metrics.

The most basic example of disparate treatment based upon reliability metrics was the 500kV transmission lines. According to PG&E personnel the 500kV lines are the backbone of the electrical transmission system and an outage on a 500kV can potentially affect millions of customers. According to the ETPM, all 500kV structures were subjected to detailed ground inspections every three years. "Critical" 500 kV structures were subjected to climbing inspections every three years and as triggered. "Non-Critical" 500 kV structures were subjected to climbing inspections every twelve years and as triggered. All 500 kV structures were also subjected to yearly patrols. In contrast, 115 kV structures were subjected to detailed ground inspections every five years, air patrols in non-detailed ground inspection years and are never subjected to climbing inspections.

Another example of disparate treatment based upon reliability metrics established by evidence developed during this investigation was the Bay Waters power towers. Since 2005, the Bay Waters towers had their own classification in the ETPM. Although the ETPM refers to the Bay Waters Foundation Inspection, numerous PG&E documents and TAM personnel established the special treatment extended to the entire tower. Some documents limited the Bay Waters towers to only towers that were actually in the water but other documents and information from some TAM personnel indicated the Bay Waters towers included all towers in the Bay Area. The justification given by TAM personnel for the special treatment of the Bay Waters towers is the highly corrosive effect of salt on steel structures. When asked why special treatment was afforded to Bay Area steel towers but not steel towers along the Sonoma, Mendocino, Humboldt, Monterrey and San Luis Obispo coasts, TAM personnel were unable to explain the difference.

The final example of disparate treatment based upon reliability metrics established by the evidence arose out of a 2018 PG&E Lab Report on the hanger plates from the Parkway-Moraga 230 kV transmission line. According to the Lab Report, the hanger plates were submitted by the Supervisor, T-Line Construction, T-Line M&C Central-Bay Maintenance. When questioned, the supervisor stated wear was observed on the hanger plates while replacing insulators on the Parkway-Moraga line in the spring of 2018. There was no mention made of the C hooks and none were preserved. According to the supervisor a tower on the Parkway-Moraga was damaged in a mudslide and needed to be repaired. In order to repair the tower the line had to be de-energized. While the line was de-energized, a decision was made to proactively replace all of the "old" insulators and hardware. The Parkway-Moraga line was built after World War II in 1946. The insulators and hardware were assumed, because PG&E has no definitive records, to be 72 years old. In contrast, the Caribou-Palermo line was 91 years old when it was de-energized for over a month in December 2012 and January 2013 as a result of tower collapse. There is no record of PG&E doing any preventative or proactive maintenance on the Caribou-Palermo line while it was de-energized. According to PG&E, the reason no preventative or proactive maintenance was done was that the winter weather was not conducive to working in the Feather River Canyon.

A former PG&E Transmission Line Supervisor who, during his career in transmission lines, worked in almost all of the transmission line maintenance districts was asked if he had noticed a difference in the way transmission lines were inspected and maintained based upon a local population base. The former supervisor responded “We’re kind of out-of-sight, out of mind up there,” “We’re always fighting the political battle,” “But if something flips the screen down there [the Bay Area] they get a lot of attention.”

### **XIII. RISK MANAGEMENT**

Prior to the Camp Fire, risk management for electric transmission was supervised by TAM. During his testimony the Senior Director of Transmission Asset Management at the time of the Camp Fire, stated that the formulation of strategies by TAM relied, in part, on the assessment of risk. He defined “Risk” as “the probability and consequence of an event occurring.” He defined probability as the “likelihood of something happening” and consequence as “the impact of that event occurring.” He defined consequence as the result of an event occurring measured by impact on safety, impact on reliability and impact on the environment.

The Camp Fire investigation focused on two types of risk; risk of equipment failure and risk of fire.

#### **A. Risk of Equipment Failure**

The recommendations of the 2010 Quanta reports focused on ways to minimize the risk of equipment failure. In summary, the Quanta reports stated wear is a product of age and failure is a product of wear. All of the complex statistical analysis in the Quanta reports boiled down to the fact a large percentage of PG&E’s transmission assets were very old and needed extra attention. Despite hiring Quanta to assess and analyze its transmission assets and make recommendations, PG&E ignored those recommendations. According to internal PG&E documents, in 2010 a committee was assigned to review and comment on the Quanta reports. Numerous current and former TAM personnel who were part of that committee were interviewed. None of the former committee members could recall who made the decision to disregard the recommendations of Quanta or why. The Senior Director of Transmission Asset Management, who was not on the committee and was not assigned to TAM in 2010 testified regarding the Quanta reports:

“The Quanta study did not look at asset data from those utilities but rather business practices from those utilities. The only age information and corresponding failure data that was used in that study was associated with the subset of assets that failed in a two-year period within PG&E and made some assumptions that made the statistical analysis incorrect. So it wasn’t sufficient for us to justify significant amounts of investments in the future, and we needed to do additional analysis in order to build the case for our regulators to be able to justify requesting authorization to be able to make additional investments in the infrastructure based on the results of that bullet point at a later date.”

Although the Senior Director of Transmission Asset Management was dissatisfied with the Quanta reports, information from the Quanta reports was used and cited in numerous subsequent TAM documents, including documents produced by himself.

PG&E internal documents and reports and a report filed with the CPUC clearly established PG&E was aware of the risk of equipment failure. In an undated internal PG&E draft report entitled “Transmission Overhead Conductors<sup>117</sup>” it was stated, “The major root cause of conductor failures is Equipment Failure (35%).” The report also stated inspections and maintenance performed according to the ETPM “are not preventing equipment failure due to wear, corrosion and other factors on conductors and associated equipment (splices).” The report also addressed the use of infrared inspections on transmission conductor: “In most cases, Infrared Inspections identify faults with components just prior to failure. Ariel (sic) inspections are conducted annually. This proactive approach yields little results.” No final copy of this report was located and it is unknown why this report was drafted and to whom this report was distributed.

In another undated, unattributed internal report entitled “EO<sup>118</sup> Transmission OH<sup>119</sup> White Paper<sup>120</sup>” the effects of equipment failure was again discussed. Whereas the Transmission Overhead Conductors was focused on conductor failure and how to mitigate/reduce the number of conductor failures, the EO Transmission OH White Paper focused on outages and how to reduce outages to improve reliability metrics. According to the OH White Paper, at the time of writing, conductors 105 years old were still in service. According to the OH White Paper, “The root causes of about 85% of the outages due to conductors from 2007 to 2012 can be attributed to trees, hardware, conductor, wind and snow...” Under the heading “Existing Conductor Strategy” the report reflects the strategy “is primarily Run to Failure (RTF), supplemented by” “periodic condition assessment and maintenance” and “program of targeted reliability improvements focusing on poorly performing lines which contribute the most to SAIFI.”

In November, 2017 PG&E filed the 2017 Risk Assessment and Mitigation Phase Report (RAMP)<sup>121</sup> with CPUC. Chapter 10 of the RAMP was dedicated to, non-wildfire risks of the electric transmission overhead system. The RAMP looked at the known risks (identified as risk drivers) to the electric transmission system and explains how PG&E is mitigating those risks. The RAMP identified “Equipment Failure – Connectors/Hardware” as a significant risk. “Deterioration of connectors, splices or other connecting hardware that results in wire down events. This driver was associated with 28 out of 279 (10.0 percent) wire down events from 2012-2016, or an average of 5.7 events per year.” Efforts to mitigate the risk of Equipment Failure – Connectors/Hardware are divided into past (2016), present (2017-2019) and future

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<sup>117</sup> The author of the report is not identified and was not identified during the investigation. Based upon content it appears the report was written in 2013

<sup>118</sup> EO is the PG&E abbreviation for Electric Operations.

<sup>119</sup> OH is the PG&E abbreviation for Overhead.

<sup>120</sup> The author of the report is not identified and was not identified during the investigation. Based upon content it appears the report was written in 2014

<sup>121</sup> Although not specific to equipment failure, the RAMP stated “Much of PG&E’s transmission infrastructure was constructed in the years following WWII. As such, many assets are nearing “end of useful life”. As these of assets near the end of their expected useful lives, PG&E will need to increase its level of asset replacements to avoid degradation in overall customer reliability and system performance.” Construction of the Caribou-Palermo line began in the months (six months) following WW1.

(2020-2022). The mitigations listed are “Inspection and Maintenance,” “Overhead Conductor Replacement” and “Insulator Replacement.”

The 2018 AMP also addressed equipment failure. The 2018 AMP used and defined the term “Risk Driver.” The definition includes reference to equipment failure:

“A risk driver is defined as an element which alone or in combination with other drivers has the intrinsic potential to give rise to risk (which can be a single risk or multiple risks). There are 83 risk drivers related to transmission overhead line assets. Though there are many risk drivers, common drivers for transmission line overhead assets include equipment failure, vegetation, natural hazards (wind, snow, earthquakes, etc.) and third-party contact. These risk drivers enable PG&E to evaluate the controls that are in place and to strategically allocate resources to programs that strengthen these controls or create new controls to mitigate these risks.”

According to the 2018 AMP “Conductor or connector/hardware failures account for 37% of all wire down events.” The AMP also stated 25% (26 of 103) of wire down events 2013-2017 were caused by failure of “connector/hardware and 42% (44 of 103) of wire down events 2013-2017 were caused by conductor failures.

The documents prove beyond any doubt that PG&E was aware of the risk of equipment failure causing conductor failure or “wire down events.” The undated draft Transmission Overhead Conductors established that at least one person within PG&E TAM was aware that inspections and patrols being done pursuant to the ETPM were doing very little to identify and prevent equipment failures.

## **B. Risk of Fire**

Since, at least 2007, fire has been identified as the number one risk for PG&E. Chapter 11 of the 2017 RAMP stated:

“PG&E defines wildfire risk as: PG&E assets may initiate a wildland fire that endangers: the public, private property, sensitive lands, and/or leads to long-duration service outages.

PG&E has designated wildfire as an enterprise risk (in addition to being a top safety risk) since 2006. This risk is reviewed annually by the Safety, Nuclear and Operations, Committee of PG&E’s Board of Directors. PG&E’s exposure to wildfire risks continues to escalate despite increasing investment in compliance and public safety programs given various environmental and human factors. The most notable investments are the T&D routine VM work and the CEMA VM work related to the drought and the ongoing tree mortality state of emergency.

The CEMA work investment alone amounts to \$190 million in 2016 and \$208 million in 2017.14 Environmental variations, such as drought conditions or periods of wet weather that drive additional vegetation growth and wildfire fuel increases, can influence both the likelihood and severity of a wildfire event.

Although vegetation management is rightfully a focus of PG&E's fire mitigation efforts, equipment failure was also identified as a significant fire risk. According to PG&E statistics included in the RAMP, 33% of fires initiated by PG&E assets were caused by equipment failure. Vegetation management caused 37% of fires initiated by PG&E assets. The RAMP breaks equipment failure into three categories: 1) conductor; 2) connector/hardware; and, 3) other. Equipment failure – connector/hardware is defined in the RAMP as "Failure of connectors, splices, or other connecting hardware resulting in wire down and fire ignition." Equipment Failure – Connector/Hardware risk driver accounts for 6 percent of 243 ignitions, or 15.5 per year.

Similar to Chapter 10 discussed above, Chapter 11 of the RAMP identified fire mitigation efforts as past (2016), present (2017-2019) and future (2020-2022). Although the RAMP listed extensive fire mitigation efforts done, being done, or planned to be done, none directly addresses the risk of connecting hardware failure.

The 2017 RAMP was not the first PG&E document that connected equipment failure – connectors/hardware to fire. The draft Transmission Overhead Conductors cited fire risk in a discussion of the "Bolted Connector Program." The Bolted Connector Program was apparently<sup>122</sup> a name given to the replacement of bolted, parallel groove connectors, which began prior to 2009. As to the Bolted Connector Program the report sets forth: "M&C<sup>123</sup> only replacing bolted connectors during routine or emergency work with to those components identified during infra-red inspection or in areas identified as high fire risk."

PG&E records also document a previous equipment failure – connector/hardware on the Caribou-Palermo line. The 2007 Rock Fire was caused by the failure of a connector on a Caribou-Palermo line.

The evidence clearly establishes, beyond a doubt, PG&E was aware of the causal relationship between fire and equipment failure on transmission towers. The vast majority of PG&E initiated fires were caused by something (a tree, an animal, a person, the ground, or a steel structure) coming into contact with an energized conductor. The entire purpose of the electric transmission system is to move electricity from point A to point B through the conductor. The entire purpose of all of the components of the overhead transmission system, except the conductor, is to keep the conductor safely hanging in the air. Essential to keeping the conductor hanging in the air is the hardware that connects the conductor to the structure. PG&E knows that if that hardware breaks the result is a wire down event. Despite all of this knowledge PG&E did absolutely nothing to identify and replace the worn hardware essential to keeping the conductor safely in the air.

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<sup>122</sup> This is the only reference to the Bolted Connector Program found in records provided by PG&E. Based upon the description of the program it refers to the replacement of bolted, parallel groove connectors.

<sup>123</sup> Maintenance and Construction

#### **XIV. San Bruno**

Early in the Camp Fire Investigation, San Mateo County District Attorney Stephen M. Wagstaffe generously and graciously assigned Senior Inspector James Haggarty to assist in this investigation. Senior Inspector Haggarty was the lead investigator on the San Bruno explosion and an expert on investigating PG&E. Senior Inspector Haggarty immediately began seeing parallels between PG&E Gas Transmission operations prior to the San Bruno explosion and PG&E Electric Transmission operations prior to the Camp Fire.

On September 9, 2010, a PG&E gas transmission line buried beneath a residential neighborhood in the City of San Bruno ruptured and exploded. The explosion and ensuing fire killed eight people, destroyed 35 structures and damaged many more. In 2014, after three years of investigation by city, county, state and federal law enforcement PG&E was federally indicted for multiple federal felony counts. PG&E was later found guilty of five felony counts by a federal jury in the Northern District of California. A transcript of the jury trial testimony and copies of all admitted exhibits were obtained from the Federal District Court in San Francisco. During that trial, testimony established two relevant factual issues: 1) PG&E record keeping was flawed; and, 2) PG&E inspection policies for the gas transmission lines were budget dependent.

During the San Bruno investigation and subsequent trial, the flaws in PG&E's historical records were exposed. Evidence established that for many of the older gas transmission lines PG&E had few records. Many of those gas transmission lines had been acquired from other gas companies and PG&E never made an effort to examine, evaluate and catalogue the components of those lines. Instead, PG&E used "assumed values" instead of inspecting the actual line to determine true values.

Similarly, during the Camp Fire investigation the evidence established that the Caribou-Palermo line was purchased from Great Western Power in 1930, and PG&E never made any effort to examine, evaluate and catalogue the line components.<sup>124</sup>

The San Bruno investigation also established that PG&E was making inspection policy decisions based on budget. Testimony and documents presented during the Federal jury trial clearly established in the years prior to the San Bruno explosion, PG&E used the least expensive inspection method to inspect older gas transmission lines, including the San Bruno line that ruptured and exploded. The chosen inspection method was less expensive in two ways: 1) it was less expensive to execute; and, 2) it was not designed to actually detect pipe integrity flaws that would require immediate and costly repair or replacement. Prior to the Camp Fire, for the Caribou-Palermo line PG&E utilized the least expensive inspection method (air patrols) in a

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<sup>124</sup> In a written response to a CPUC data request PG&E states "PG&E has not historically maintained an inventory of suspension hooks or their manufacturers, age or material composition. As a result, PG&E does not have an inventory of all transmission and distribution facilities in the entire PG&E service territory organized by location and the presence of suspension hooks similar to the Incident Location 1 suspension hook. Suspension hooks are common hardware on transmission structures and occasionally are used on distribution structures. In PG&E's service territory, there are in excess of 50,000 steel transmission structures, most of which have multiple suspension hooks of some type supporting insulators and other equipment. There are also suspension hooks on many of the nearly 100,000 non-steel transmission structures in PG&E's service territory. There are more than two million distribution poles in PG&E's service territory."

manner guaranteed not to detect any problems that would require immediate and costly repairs. Because troublemen were not finding safety problems requiring repairs, PG&E was able to devote capital budget funds to projects focused on improving reliability metrics.

The evidence uncovered during the investigation and presented during trial clearly established the San Bruno explosion was the direct result of the fact that, because of faulty record keeping, PG&E was unaware of the potential threat/defect in the San Bruno pipe. Because PG&E intentionally used an inspection method that could not detect the potential threat/defect, the threat/defect was not found.

## **XV. THE BUTTE FIRE**

On September 9, 2015, a pine tree fell onto an energized PG&E distribution line in Amador County sparking the Butte Fire. The Butte Fire burned over 70,000 acres in Amador and Calaveras Counties, killed two people and destroyed hundreds of structures. Cal Fire conducted an investigation of the origin and cause of the Butte Fire. PG&E was not criminally prosecuted for the Butte Fire. A civil suit was brought against PG&E by the victims of the Butte Fire in the Sacramento County Superior Court. Early in the Camp Fire Investigation, records from the Butte Fire civil suit, including investigative reports and deposition transcripts, were obtained and reviewed.

The investigation into the Butte Fire focused on the PG&E vegetation management practices in the Stockton Division. Similar to the ETPM in the transmission division, PG&E had written policies for distribution vegetation management. Much like the Camp Fire investigation, the evidence uncovered during the Butte Fire investigation established as a result of reductions of the vegetation management budget, the written vegetation management policies were not being followed; vegetation management inspections and patrols were being conducted by unqualified, untrained, inexperienced personnel;<sup>125</sup> and PG&E was instructing those tree inspectors to ignore all but the most dangerous conditions. Additionally the evidence established PG&E had no quality assurance programs to monitor and evaluate the vegetation management program. As with the transmission inspection and patrol policies in effect at the time of the Camp Fire, PG&E relied solely on the observations of unqualified, untrained and inexperienced inspectors to identify dangerous conditions.

## **XVI. DROUGHT AND WIND**

Since at least 2013, PG&E was aware of increased risk of catastrophic wildfires. Chapter 11 of the 2017 RAMP begins:

“Extreme weather, extended drought and shifting climate patterns have intensified the challenges associated with wildfire management in California. Environmental extremes, such as drought conditions followed by periods of wet weather, can drive additional

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<sup>125</sup> The vegetation management program was conducted by hired contractors.

vegetation growth (fuel) and influence both the likelihood and severity of extraordinary wildfire events.

Over the past five years, as we have seen across California, inconsistent and extreme precipitation, coupled with more hot summer days, have increased the wildfire risk and made it increasingly more difficult to manage.

The risk posed by wildfires has increased in PG&E's service area as a result of an extended period of drought, bark beetle infestations in the California forest and wildfire fuel increases resulting from record rainfall following the drought, among other environmental factors. Other contributing factors include local land use policies and historical forestry management practices. The combined effects of extreme weather and climate change also impact this risk."

According to the United States Geological Survey<sup>126</sup> three of the five worst droughts<sup>127</sup> in California history have occurred since 2001. The three droughts listed are 2001-2002, 2007-2009 and 2012-2016. According to the U.S Drought Monitor<sup>128</sup> in 2012 the Feather River Canyon was classified as "Abnormally dry." By 2013 the Feather River Canyon was classified as "Severe Drought." By 2014, and through 2015, the Feather River Canyon was given the highest drought classification: "Exceptional Drought"

According to an internal PG&E presentation from late 2013 entitled "Wild Fire –Enterprise Risk", PG&E was already aware of the heightened fire risk. "Wild Fire risk in California is increasing due to weather conditions and resulting record low fuel moisture content. Fire activity has seen a significant increase in 2013 as compared to 2012 with PG&E responding to 36% more fires YTD. Acreage impact as compared to 2012 is almost doubled."

According to the presentation PG&E created "administrative zones for areas at highest risk of a major wildland fire and proactively addresses these areas through operational and asset management standards. Current administrative wildland fire boundaries encompass geographies which exhibit a combination of active fire history, fire prone vegetation, terrain that promotes rapid fire spread, and/or locations specified by existing regulations for special treatment." The presentation includes a map of "Wildfire Administrative Areas at PG&E." The Feather River Canyon, from approximately Beldon to Lake Oroville appears to fall within a Wildfire Administrative Area. Under the title "Lessons Learned: Previously-Approved Mitigation Activities" bolted connector inspection/replacement is listed with the note "Wild Fire zones are now a consideration for program rollout prioritization."

Also in 2013 PG&E published the "Wild Fire Administrative Zones in PG&E's Service Area" map. According to this map the Feather River Canyon is falls within an "Other Wildfire Area." In 2014 PG&E Transmission Asset Strategy compiled a list of all transmission structures located within the boundaries of a designated wild fire area. Approximately 85 towers on the Caribou-Palermo line between the Butte-Plumas County line and the Big Bend Substation were included

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<sup>126</sup> ca.water.usgs.gov

<sup>127</sup> measured by precipitation and runoff

<sup>128</sup> <https://droughtmonitor.unl.edu>

on the list. Tower 27/222 for some unknown reason was not on the list, but Towers 22/187 through 23/192 (which did not exist in 2014 because they had collapsed in 2012) were listed.

According to PG&E documents, including publicly available reports, PG&E has its own meteorological department and continuously monitors data from both its own weather stations and government weather stations. The closest weather station to Tower 27/222 is the Jarbo Gap RAWS<sup>129</sup>. Meteorologist Kris Kuyper analyzed data from the Jarbo Gap RAWS, as well as other government sources including the National Oceanic and Atmospheric Administration and the U.S. Drought Monitor and PG&E. According to Kuyper's analysis, although the winter of 2016-17 was very wet and broke the 2012-16 drought, the winter of 2017-18 was dry "abnormally dry." Although the season as a whole was abnormally dry, March and April were wet. As a result of spring rains, native grasses grew in abundance. In May the rain disappeared.<sup>130</sup> From June 1, 2018 through November 8, 2018, there was no measurable rain in Paradise.<sup>131</sup>

Because of the lack of rain, by November 8, 2018 the EDDI<sup>132</sup> listed the Feather River Canyon in the ED3 or ED2 drought categories<sup>133</sup>. Based upon the lack of rain and the EDDI statistics, Kuyper opined that the dry air was "taking moisture from the plants, draining the plants of their moisture, making them even drier than they should have been." As a result, on November 8, 2018 the Feather River Canyon was approaching "record dry levels of fuel (trees, shrubs, bushes, grasses)."<sup>134</sup>

According to data from the Jarbo Gap RAWS station from 9:13pm on November 7, 2018 until 5:13am on November 8, sustained winds were between 24 mph and 32 mph with gusts between 41 mph and 52 mph. According to Kuyper this wind pattern was not unusual for Jarbo Gap. Based upon analyzing six years of wind data from the Jarbo Gap RAWS Kuyper determined that Jarbo Gap experiences this wind pattern approximately 20 times per year,<sup>135</sup> the majority of which occur from October through February.<sup>136</sup>

According to Kuyper, the Jarbo Gap winds occur as the result of a difference in atmospheric pressure between east of the Sierra Nevada and west of the Sierra Nevada. Higher pressure over the Great Basin in Nevada forces air west, towards lower pressure on the west side of the Sierra Nevada. The Sierra Nevada blocks this, except through gaps and passes such as the Feather River Canyon. The air is then channeled through the gaps and passes, which accelerates the flow of air. Cold air flowing downhill also causes acceleration.

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<sup>129</sup> Remote Automated Weather Station

<sup>130</sup> Average rainfall in Paradise area in May is approximately .5". May, 2018 rainfall for Paradise was .14".

<sup>131</sup> Average rainfall in Paradise area in October is approximately 3".

<sup>132</sup> Environmental Demand Drought Index, esrl.noaa.gov

<sup>133</sup> On a scale of 0 – 4. 0 being normal, ED2 is defined as "Severe Drought." ED3 is defined as "Extreme Drought." 4 being "Exceptional Drought."

<sup>134</sup> <https://gacc.nifc/oncc/fuelsFireDanger.php>

<sup>135</sup> From 2013-2019, 118 individual events with wind gusts over 45mph, 66 individual events with wind gusts over 50 mph.

<sup>136</sup> October averages more than 5 events per month, November averages under 2.

Internal PG&E records established PG&E has known since the mid-1980s that high winds constitute a serious threat to its electric transmission assets. In 1990, PG&E Research and Development published the “Extreme Wind Speed Estimates Along the PG&E Transmission Line Corridors” report. The report was the result of a five year study, recommended by the CPUC, “to assess the adequacy of PG&E’s power wind loading design criteria” after five separate incidents in which transmission line assets were toppled during wind storms in 1982 and 1983. The report mainly focused on the 500kV transmission line corridors. According to the report “Electric transmission lines in the PG&E service area were originally designed to withstand wind loadings associated with 1-minute average gusts to 57 miles per hour (mph). The report concludes the original PG&E wind loading criteria for transmission lines was inadequate at some locations and needed upgrade. According to the reports, from November 1984 through November 1985 PG&E had wind meters installed at the Cresta Reservoir and the Rock Creek Reservoir in the Feather River Canyon. Both locations recorded gusts in excess of 50 mph hour in November, 1984 (54.6 mph) and February, 1985 (70.9 mph).

In 1999, PG&E Technical and Ecological Services published an updated “Extreme Wind Speed Estimates Along the PG&E Transmission Line Corridors.” The report stated “Electric transmission lines throughout the PG&E service area were originally designed to withstand wind loadings of 70 miles per hour.” No explanation was given as to why the original wind loading design increased from 57 miles per hour (as stated in the 1990 report) to 70 miles per hour between 1990 and 1999. Although not stated as a justification for the update, the report did note that severe storms in January, March and December of 1995 caused approximately \$100 million damage to electrical transmission and distribution systems. The report mainly focused on the 500kV transmission line corridors and Bay Area, while noting a lack of wind data from the Sierra Nevada and northeastern areas. The report did include the 1984-85 wind speed data from the Rock Creek and Cresta reservoirs.

The 1999 report included a section entitled “Santa Ana Type Winds.” According to the report Santa Ana type winds occur because ‘High pressure frequently forms in the Great Basin area of the Rockies in the vicinity of Utah and Nevada during winter months. When pressure builds beyond a critical point, air spills through the mountain gaps, gaining momentum as it flows to lower elevations.’ The report recognized although mainly thought to be a Southern California phenomenon, Santa Ana type winds do occur in Northern California, mainly in the Tehachapi region near Bakersfield.

In 2015, PG&E Applied Technology Services published the “Extreme Wind Speed Estimates Across the PG&E Service Territory” report. This report updated and built upon the previous wind reports. According to the report “major wind storms” occurred in December, 2005, January, 2008, October, 2009 and January 2010. The report did not mention the December, 2012 wind event that toppled five Caribou-Palermo line towers.<sup>137</sup>

The 2015 wind report refers to “Offshore/Northerly Wind Events.” According to the report:

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<sup>137</sup> According to historical wind data for RAWS available at <https://wrcc.dri.edu> the maximum wind gust speed recorded by Jarbo Gap RAWS on December 21, 2012 was 30 miles per hour.

These events occur when surface high pressure develops north or east of the territory, which sometimes occurs as storm systems bypass California to the north and drop southeast of the territory generally east of the Sierra Nevada. This pattern produces a northerly to easterly pressure gradient and offshore winds. When flowing downhill these winds are known as ‘katabatic’ winds and are also named by geographic location in some instances (e.g. Diablo, Mono).

The wind report does not recognize the Feather River Canyon/Jarbo Gap winds. The wind report does conclude:

“The quality and precision of the data is proportional to the density of weather stations in the analysis and is generally higher in the Bay Area and Central Valley where station coverage is robust and lower in the Sierra Nevada and Coastal Ranges. Since wind speeds were produced from the RAWS in the more remote terrain in the Sierra Nevada and north and south Coast Ranges and since RAWS are more often located in more exposed terrain, the isotachs<sup>138</sup> ... typically represent ridge top winds.”

According to the report the “most notable offshore wind event in recent history occurred on November 30 to December 1, 2011, which produced katabatic winds across the Sierra Nevada and the elevated terrain of the Bay Area and Central Coast. Wind gusts from 40-60 mph were observed across the central and southern Sierra Nevada foothills...” According to historical wind data from the National Oceanic and Atmospheric Administration gusts of 66 mph were recorded at Jarbo Gap on November 30, 2011.

The report also concluded “Offshore or Northerly wind events are typically associated with extreme fire danger and can be strong enough to produce widespread damage to distribution and transmission infrastructure.”

This natural phenomenon has been occurring for many years. Exponent also analyzed the wind in the Feather River Canyon. According to the Exponent Report, the Caribou-Big Bend section of the line experienced the highest average wind speed, the highest average time at high wind conditions and the highest percentage of towers that experience more than 605 hours of high wind conditions per year of the comparison transmission lines.

During its investigation, the CPUC asked PG&E if PG&E had “ever done a wind loading study” on Tower 27/222. In its written response<sup>139</sup> PG&E stated “A wind loading study was completed as part of the initial installation of the transmission line between 1919 and 1921” and “PG&E’s understanding based on its records is that no additional wind loading studies were performed on the two towers (27/222 and 27/221) since the installation of the transmission line between 1919 and 1921. PG&E’s transmission line design criteria do not require analysis on structures for which no significant work is proposed.” According to the design criteria listed in PG&E’s written response, the towers were designed to withstand winds of approximately 56 miles per hour. During the short period of time that wind meters were installed at the Cresta Reservoir and

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<sup>138</sup> An isotach is a line on a map connecting points of equal wind speed.

<sup>139</sup> CPUC Data Request SED-002, Question 27.

the Rock Creek Reservoir in the Feather River Canyon, PG&E recorded wind gusts over 70 miles per hour. From 2013 to 2019 the Jarbo Gap RAWS station recorded wind gusts over 50 miles per hour over 60 times. Despite the fact the towers of the Caribou-Palermo line were routinely subjected to winds at or near their design criteria, PG&E never inspected or tested any of the towers or components for wind damage.

Based upon the meteorological data, PG&E knew that the Feather River Canyon was a drought ravaged tinderbox. Based on their own reports, PG&E also either knew or should have known the Feather River Canyon experiences katabatic winds during the fall when the fire danger is highest. Despite its own meteorological data, PG&E chose not to replace the aged and deteriorating conductor and components on the Caribou-Palermo line.

## **XVII. PUBLIC SAFETY POWER SHUT-OFF**

On November 6, 2018, PG&E issued a Public Safety Power Shut-Off (PSPS) notice to approximately 70,000 PG&E customers in nine California counties, including Butte. The PSPS notified customers of potential de-energization of power lines on November 8, 2018, based upon meteorological forecasts. On November 6 and November 7 PG&E went to great lengths to notify customers in the nine counties of the potential de-energization<sup>140</sup> on November 8, 2018. On November 8, 2018 PG&E decided not to de-energize power lines.

An initial focus of the Camp Fire Investigation was the decision by PG&E not to de-energize power lines in the Feather River Canyon prior to ignition of the Camp Fire on November 8, 2018.

The PG&E PSPS Policy was enacted in September, 2018. A PSPS guide was published on the PG&E website {[Attachment - Public-Safety-Power-Shutoff-Policies-and-Procedures-September-2018](#)} in September 2018. PG&E's PSPS Policy was enacted based upon a CPUC decision in July, 2018<sup>141</sup> to allow electrical utilities to pro-actively de-energize<sup>142</sup> at-risk power lines during wind events. The PSPS guide publicly available on the PG&E website broadly described the meteorological conditions necessary for de-energization. The publicly available PSPS guide used the term "power lines" and did not differentiate between distribution and transmission lines or by voltage or area.

Based upon the meteorological data, {[Attachment - Jarbo Gap Weather Station Readings](#)} the conditions in the Feather River Canyon in the hours prior to the failure of the C hook on Tower 27/222 exceeded the wind conditions necessary for de-energization under the publicly posted PSPS guidelines.

However, the Butte County DA obtained copies of the PSPS policy filed by PG&E with the CPUC. The actual PSPS policy was much more detailed and specific than the guide published

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<sup>140</sup> In layman's terms shutting off the power.

<sup>141</sup> CPUC Resolution ESRB-8.

<sup>142</sup> In layman's terms shutting off the power during high wind events to avoid fires caused by contact between energized power lines and objects such as vegetation.

on PG&E's public website. As opposed to the publicly posted PSPS guide, the official PG&E PSPS policy differentiated between transmission and distribution lines. The actual policy specifically and explicitly exempted all 115kV, 230kV and 500kV transmission lines from the PSPS. After comparing the PSPS guide published on the website with the actual PSPS policy, it appears the authors of the public PSPS guide, in an effort to make the guide understandable to the average PG&E customer, simplified the policy to an extent that became misleading.

Additionally, the transmission and distribution lines in the Feather River Canyon were not within the area of PSPS program. According to internal PG&E documents, inclusion of 115kV transmission lines in the new PSPS program was initially considered. The committee drafting the PSPS policy explored three transmission line options: 1) all 70kV and below; 2) all 115kV and below; 3) all 70kV and below and some 115kV depending upon factors such as location within high fire threat areas. Ultimately the committee settled on all 70kV transmission lines and below and exempted all 115kV transmission lines from the PSPS program. PG&E did not provide any written documents explaining or justifying this decision. However, based upon all the documents provided, there was no evidence the decision to exempt all 115kV transmission lines and above was reckless or criminally negligent. Based upon the 2018 PG&E PSPS policy, the Caribou-Palermo line was not subject to de-energization prior to the ignition of the Camp Fire and was therefore not included in any PSPS. However if PG&E had included 115 kV lines, the Caribou-Palermo line should have been included based on the extreme wind conditions in the Feather River Canyon.

## **XVIII. KNOWLEDGE OF RISK/CONSEQUENCE**

Internal PG&E documents show that by 2006 PG&E was aware that equipment failure (risk) causes fires. According to the October 2006 Risk Analysis of Urban Wild land Fires, written by the PG&E Enterprise Risk Management Committee, in 2005 PG&E electrical equipment failures caused 20 fires. That same document defined the Urban Wild Land Interface area as the “geographical area where structures and other human development meets or intermingles with wild land or vegetative fuels” and lists aging infrastructure as a potential “gap” in PG&E’s fire mitigation efforts. Another potential gap identified by PG&E is “our asset strategy to address urban wildland fires is limited.” To mitigate this potential gap the report included the following “Proposed Solutions:”

- Identify urban wildfire geographic area
- Identify quick result items such as:
  - Perform patrols/inspections just before fire season
  - Replace parallel groove (PG) connectors
  - Inspect equipment that could be high risk.

The 2009 Enterprise Risk Management Urban Wildland Fire Risk Review report written for the Executive Management Committee specifically listed as fire risk drivers:

- Failure to perform quality inspections or workmanship
- Inadequate procedures relating to fire danger
- Failure to consider local conditions in design standards

Improperly maintained equipment  
Failure to replace aging equipment.

Under “Current Mitigation Activities,” the report specifically listed “Equipment maintenance and replacement programs, including patrols and inspections.”

These themes were repeated in Enterprise Risk Management (ERM) reports for several years.

“EMC: Electric T&D Asset Road Map,” an internal PG&E document believed to have been published within the company in 2010, stated:

“For more than twenty years, PG&E’s asset management practices have focused on maximizing the utilization of T&D<sup>143</sup> assets and reducing capital investments to the greatest extent possible. Only recently has the Company utilized an alternate approach that places a higher value on reliability and operational flexibility of the electric T&D system. It is recommended that PG&E continue this current approach to pursue a combination of measures designed to upgrade and modernize its aging electric T&D assets.”

In the section of the document entitled “Aging Assets” it is stated:

“While much has been done in the last several years to improve the design, maintenance and operations of the system, the Company’s electric T&D assets comprise an aging system that it operated close to its design capacity limits. Many of our electric T&D facilities were installed in the 1950s and planned lifetime design for these facilities is 40 years. Continuing to rely on aging facilities has increased the Utility’s risk of equipment failure and extended service interruptions. Additionally, the repair time and costs for failed equipment is much higher than planned replacement.”

In December 2018, in response to questions from the Honorable William Alsup, Judge of the United States District Court, Northern District of California, PG&E submitted to the Federal District Court a list of all fires caused by PG&E 2014-2017. 2017 {[Attachment – PGE caused fire 2014-17](#)}. According to the list there were eighteen fires caused by equipment failures on transmission lines.

The list submitted to the Federal District Court did not include the 2008 Rock Fire and the 2018 Murphy Fire,<sup>144</sup> both of which occurred in the Feather River Canyon and both of which were caused by equipment failures on transmission lines. The Rock Fire was caused by the failure of a connector on a tower on the Caribou-Palermo line. The Murphy Fire was caused by the failure of a connector on a tower on the Caribou-Table Mountain 230kV transmission line. In both fires the failure of a connector allowed an energized jumper conductor to make contact with the steel tower structure and sent a shower of molten metal onto dry vegetation at the base of the tower.

In the 2017 RAMP, PG&E clearly identified equipment failure as a known cause of fire. According to section C of Chapter 11, Drivers and Associated Frequency, there were an average of 243 fires per year during 2015-16 causes by PG&E. Of those 243, on average 82.5 (33%)

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<sup>143</sup> PG&E abbreviation for Transmission and Distribution

<sup>144</sup> The Murphy Fire occurred on August 6, 2018. The origin of the fire was directly below a PG&E transmission tower – not the Caribou-Palermo line – just west of Belden in the Feather River Canyon. The fire was caused by equipment failure – specifically failure of a connector – which allowed an energized 230kV conductor to come into contact with steel tower structure.

were caused by equipment failure. Equipment failure caused fires are broken down into Conductor (29.5 per year), Connector/Hardware (15.5 per year) and Other (37.5 per year).

The evidence clearly established PG&E has been aware of the risk/consequence connection between equipment failure and fire since at least 2005. Similarly, the evidence also clearly establishes that PG&E was aware of the risk/consequence connection between aging infrastructure and equipment failure.

In 2009 PG&E retained Quanta Technologies to review, assess and critique the electrical transmission system. In 2010 Quanta submitted to PG&E the Transmission Line Component Management Report. The report was divided into a series of individual reports. Each report focused on a component of the electrical transmission system. Not all of the reports were relevant to the risk of equipment failure on transmission towers.

Relevant individual reports and information in those reports was summarized:

#### Transmission Line Component Management Executive Summary

“As part of a comprehensive effort to manage its infrastructure PG&E Transmission Asset Management has begun study of all components of transmission line infrastructure, both overhead and underground, to develop an understanding of the component behavior over its installed service life. The intent of this effort is to ultimately develop an understanding of what the expected service life of line components should be, given normal operating and maintenance practices of the service life. This understanding also drives decisions of what the “normal” operating and maintenance practices should be to allow a component to survive to an “end of service life” condition, barring external events that cause sudden or catastrophic failure of a component (e.g. severe weather event, vehicular impact).”

“Certain aspects of a utility maintenance program can be characterized as following a “run to failure” philosophy. The practice of allowing equipment to fail often applies to utility equipment that is large in total population but low in overall impact to the system and/or customer reliability.”

“Run to failure as a maintenance philosophy has a place in the overall maintenance program of a utility. The equipment managed under this philosophy, however, is generally high volume, low risk facilities. Operational risk, technical effectiveness, and financial considerations drive the determination.”

#### Conductor and Fittings

“Based on PG&E conductor inventory data, the average age of 115 kV copper conductor on the PG&E system is 75 years. Conductor other than copper at 115 kV averages 36 years of age.<sup>145</sup>”

“The overall age of conductor is a concern to most utility asset managers and the concern is based primarily in lack of knowledge of what is to be expected from aging conductor.”

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<sup>145</sup> The conductor on Tower 27/222 was aluminum.

“Greatest risk of failure in transmission conductors is thought to be with the oldest steel reinforced conductors<sup>146</sup>.”

### Insulators

“...the failure rate of porcelain increases at a faster rate as they age beyond 50 or so years. Nonetheless, even with increasing failure rate, porcelain is only projected to a rate of 0.06 failures per at age 60.”

“Industry has come to expect a service life for porcelain and glass insulators beyond 50 years. The service life is contingent of course on the original quality and proper application of the units.”

“...lack of data consistency and accuracy result in the need for many assumptions to address data voids. Accurate information on insulator type (porcelain, glass, poly), vintage, manufacture, date of installation, and location is critical to building a dataset that will facilitate meaningful statistical analysis over the service life of the material.”

### Structures

63% of the 104 electrical utilities surveyed utilized routine climbing inspections as part of inspection policy. The average inspection period for climbing inspections was 4.2 years.

44.4% of PG&E 115kV structures were installed prior to 1931.

Component service life was calculated based upon condition and environment. Environment was further divided by “Mild,” “Avg.” and “Severe.” For “Twr attachments : Susp/Jumper.” for the condition “Wear” and environment “Wind run” the component life in years is Mild – 80 years, Avg – 57 years, and Severe – 35 years.

“With recognition of the issues associated with aging infrastructure, more attention is expected to be given to steel tower condition throughout the industry.”

“Inspection, repair, and refurbishment of steel structures and associated components (guys, anchors, foundations, etc.) are a critical part of the ongoing maintenance and management of the transmission infrastructure. Normal aging and deterioration, coupled with years of inadequate inspection and maintenance, put many structure at a point of less than desired structural integrity.”

“A comprehensive maintenance and inspection program for an aging structure population should include a diagnostic testing component, particularly when structures reach an age threshold that is appropriate. That threshold varies by many factors: geographic location and associated environmental conditions, age of infrastructure, proximity to other infrastructure, historical performance of similar vintage structures in the company, etc.”

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<sup>146</sup> Steel reinforced conductor has a solid steel core to increase the strength of the conductor. The conductor on Tower 27/222 was steel reinforced.

“An effective strategy for structure and foundation management would include elements such as:

Routine visual inspections by ground patrol and aerial patrol as part of general line inspection process,

Comprehensive climbing inspection at 3-5 year intervals,

....

Laboratory testing of components removed from service as part of repair or replacement work to determine overall condition and remaining strength of material.”

“For a population of structures and foundations such as exists at PG&E, the leading criterion for determining inspection and testing targets, would initially be age. With a structure population age span of over 100 years (according to inventory records), a programmed sampling of the population over 80 years of age to test structure and foundation integrity would be an appropriate beginning.”

According to Figure 9.1<sup>147</sup> the only structures still in use at the time of the report that were built prior to 1923 (87 years of age at time of report) were 115kV structures. According to a footnote to Figure 9.1 and subsequent figures in section 9, there are 6908 115kV structures for which PG&E has no age data. According to other PG&E reports there are 18,800 115kV structures in the PG&E inventory.

The evidence developed during this investigation clearly establishes that PG&E essentially ignored the recommendations of the Quanta Reports. PG&E did not adopt any new policies or procedures for inspection of the oldest transmission assets. There is no evidence of a programmed sampling of the oldest structures and foundations. Even the collapse of five Caribou-Palermo line structures in 2012 did not cause PG&E to take a closer look at one of their oldest transmission assets. In 2010 the TLine Structures Committee met to review the Quanta Reports. Neither The Senior Engineer nor the former Transmission Specialist, members of the TLine Structures Committee and “Required Attendees” of the 2010 meeting, had any recollection of the alleged meeting or any recommendations regarding the Quanta Reports made by the committee. Neither was able to shed any light on the question as to why the recommendations of the Quanta Reports were not adopted. According to the Senior Director of Transmission Asset Management, who was not involved in the TLine Structure Committee at the time of Quanta Reports, the recommendations of the Quanta Reports were ignored because “we could not rely on the information in the Quanta study.” The Senior Director explained:

“The Quanta study did not look at asset data from those utilities but rather business practices from those utilities. The only age information and corresponding failure data that was used in that study was associated with the subset of assets that failed in a two-year period within PG&E and made some assumptions that made the statistical analysis incorrect. So it wasn't sufficient for us to justify significant amounts of investments in the

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<sup>147</sup> A line graph displaying the age distribution of PG&E transmission structures.

future, and we needed to do additional analysis in order to build the case for our regulators to be able to justify requesting authorization to be able to make additional investments in the infrastructure based on the results of that bullet point at a later date.”

The Senior Director of Transmission Asset Management also stated “I didn't have high confidence in the Quanta study so we intended to do additional benchmarking and collaboration in the industry in order to come up with more robust information.”

In addition to general knowledge of the problems of wear and failure in aging infrastructure, PG&E had specific knowledge that C hooks and hanger holes suffer rotational body on body wear as far back as 1987.

According to internal PG&E documents, in 1987 a transmission line crew noticed concerning wear patterns on both the C hooks and the hanger holes on the Oleum-G transmission line<sup>148</sup>. The transmission line supervisor removed the C hooks and hanger holes from the tower structure and sent them to the PG&E Lab for analysis. The PG&E lab evaluated the C hooks (referred to as J hooks in the report) and hanger holes (referred to as attaching plates) and issued a Laboratory Test Report on February 9, 1987. According to the report “Both of the J-Hooks and their attaching plates had grooves worn in them and there was concern that they may not be able to hold the weight of insulator strings that are suspended from them.” The lab report included photographs of the C hooks and the hanger holes. Figure 1 of the report is a picture of one of the C hooks. According to the caption to Figure 1 “As shown in the Figure above a wear pattern was formed in the bowl-saddle of the J-hook. This was possibly caused by the insulator string swinging in the wind over a period of time.” Figure 2 of the report is a photograph of one of the hanger holes. According to the caption to Figure 2 “This figure shows the key-hole wear in the plate eye caused by the J-hook while in service.”

In 2011, PG&E transmission line crews working in the South Bay, observed similar wear on hanger holes on the Jefferson-Hillsdale transmission line. Photographs were taken of the wear and sent to PG&E engineers. After reviewing the photographs a Supervising Engineer responded via email “Looking at the photo of the hanger plate. I would recommend changing it to a new plate. It appears that there is a groove cutting into the plate probably caused by years of rubbing between the c-hook and the plate.”

In March of 2018, PG&E transmission line crews working on a transmission line in the East Bay observed similar wear on hanger holes. The transmission line supervisor, removed the hanger plates from service and sent them to the PG&E Lab for review and analysis. On June 20, 2018, the PG&E Lab issued a report entitled “Metallurgical Evaluation of Insulator Suspension Plates from the Parkway-Moraga 230 kV line at structure 020/115. The report found that “the wear was attributed to wind-driven swinging of the insulators (wind-sway).” The report opined a wear rate of .007” per year and a useful life of the hanger plates of 97-100 years based upon the wear rate and the expected strength of the remaining metal.

The evidence establishes that PG&E is aware that wear increases with age, the possibility of equipment failure increases relative to the amount of wear, and, ignition of a fire is a definite

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<sup>148</sup> The Oleum-G transmission line is located in Contra Costa County, just south of the Carquinez Bridge and near the community of Valona. The Oleum-G line is one of the segments of the original Caribou-Valona line still in service. It is believed, but not confirmed that the tower from which the C hooks and hanger holes were removed was an original, 1921 Caribou-Valona tower and the worn C hooks were vintage 1921.

possible consequence of equipment failure. It is clear, based upon the internal PG&E documents that PG&E has clearly understood, at least since 2006, the correlation between aging infrastructure and fire.

The Quanta Reports and internal PG&E reports clearly established a connection between wear and inspection/patrol. From the October 2006 Risk Analysis of Urban Wild land Fires through the 2017 RAMP inspection and patrol are specifically listed mitigation to fire threat. Since 2005 PG&E electric transmission inspection, patrol and maintenance policies are set out in the Electric Transmission Preventative Maintenance Manual (ETPM). According to section 1.2 of the ETPM “Inspection and patrol procedures are a key element of the preventive maintenance program. The actions recommended in this manual reduce the potential for component failure and facility damage and facilitate a proactive approach to repairing or replacing identified, abnormal components.”

## **XIX. PERSONAL LIABILITY FOR PG&E EXECUTIVES**

During the course of the Camp Fire investigation, many witnesses from PG&E were interviewed and examined under oath by the Grand Jury. Many, many internal discussions were had as to whether there was sufficient evidence to indict any individual PG&E personnel or executives. It was finally determined based on the current state of the law in California and the facts discovered during the investigation that there was insufficient evidence to proceed against individuals.

### **A. The Law:**

Many people have heard of or understand the concept of “Respondeat superior” (Latin for “Let the Master answer”) in which an organization’s top executives are held **vicariously liable** for the actions/omissions of their subordinates regardless of the executive’s personal participation or knowledge. However this is a **civil concept** that does not apply in **criminal** cases. The leading California case in the area of **corporate officer criminal liability** is *Sea Horse Ranch, Inc. v. Superior Court* (1994) 24 Cal. App. 4th 446, which states: “[A]n officer of a corporation is not criminally answerable for any act of a corporation in which he [or she] is not personally a participant. In the context of negligent homicide such an officer would be said not to be liable unless he or she was personally aware of the omissions or other behavior that gives rise to the criminal negligence. The decisions involving criminal liability of corporate officers, either expressly or impliedly, focus either on the officer’s direct participation in illegal conduct, or his or her knowledge and control of the illegal behavior. **The mere fact of the officer’s position at the apex of the corporate hierarchy does not automatically bestow [criminal] liability.”**

### **B. The Facts:**

Based upon the forensic analysis of the failed “C” hook from the suspect tower, it was the opinion of the experts consulted that the wear which caused the hook to break occurred gradually over almost 100 years. It is our belief the wear had been visible for at least 50 years. Over the past 50 years scores of PG&E employees should have been in a position to observe the wear. However, none of the employees documented the wear. Since nobody apparently noticed the wear, it would be impossible to prove any single person was negligent. Additionally PG&E

culture made decision-making “by committee” a standard, virtually eliminating individual responsibility. A “silo mentality” also pervaded the company in which departments and management groups did not share information, goals, tools, priorities and processes with each other. (E.g. The PG&E Tower Division took responsibility for maintenance of the steel tower structures. The PG&E Line Division took responsibility for the maintenance of the power lines. The “C” hooks seemed to fall between their two responsibilities – i.e. neither took responsibility for the hooks, assuming the other division was responsible, which left the hooks as orphan equipment.)

### **C. Conclusion:**

Many of the decisions that ultimately lead to the Camp Fire were made in the 1980s, 1990s and 2000s. It would be almost impossible to prove a person making decisions in 1995 knew the decision was creating the risk of a catastrophic fire over 20 years later and either disregarded or ignored that risk. **But the corporation as an entity is tasked with that knowledge and reckless behavior and was so indicted.**

## **XX. ELEMENTS OF THE OFFENSES**

Unlawfully Causing a Fire to a Structure/Forest land (Pen Code § 452(c))

- a. PG&E set fire to, or burned, or caused the burning of a structure or forest land or property;
- b. PG&E did so **recklessly**;
- c. The fire burned an inhabited structure or the fire caused great bodily injury to another person.

Definition of Recklessly

A corporation acts recklessly when:

- a. It is aware that its actions present a substantial and unjustifiable risk of causing a fire.
- b. It ignores that risk
- c. Ignoring the risk is a gross deviation from what a reasonable person would have done in the same situation.

Involuntary Manslaughter (Pen. Code §192(b))

- a. PG&E had a legal duty to the decedents
- b. PG&E failed to perform that legal duty;
- c. PG&E’s failure was **criminally negligent**;
- d. PG&E’s failure caused the death of decedents

Definition of Criminal Negligence

- a. Criminal negligence involves more than ordinary carelessness, inattention, or mistake in judgment. A corporation acts with criminal negligence when:

- i. It acts in a reckless way that creates a high risk of death or great bodily injury;
- ii. A reasonable person would have known that acting in that way would create such a risk.
- b. In other words, a corporation acts with criminal negligence when the way it acts is so different from how an ordinarily careful person would act in the same situation that its act amounts to disregard for human life or indifference to the consequences of that act.

## **XXI. DUTY**

On September 24, 2016, the Governor signed 2016 Cal SB 1028. SB 1028 added Chapter 6 to division 4.1 of the California Public Utilities Code. One of the newly created sections was 8386, which took effect on January 1, 2017. Section 8386 created a statutory duty on electrical utility companies. Section 8386(a) states “Each electrical corporation shall construct, maintain, and operate its electrical lines and equipment in a manner that will minimize the risk of catastrophic wildfire posed by those electrical lines and equipment.”

California Public Utilities Code section 451, enacted in 1951 and amended in 1977, states “Every public utility shall furnish and maintain such adequate, efficient, just, and reasonable service, instrumentalities, equipment, and facilities, including telephone facilities, as defined in Section 54.1 of the Civil Code, as are necessary to promote the safety, health, comfort, and convenience of its patrons, employees, and the public.”

The California Public Utilities Commission promulgates regulations known as General Orders (GO). GO 165 section IV states “Each utility shall prepare and follow procedures for conducting inspections and maintenance activities for transmission lines.”

GO 95 includes multiple rules that apply to electrical transmission line safety, including:

- 1) Rule 31.1  
Electrical supply and communication systems shall be designed, constructed, and maintained for their intended use, regard being given to the conditions under which they are to be operated, to enable the furnishing of safe, proper, and adequate service. For all particulars not specified in these rules, design, construction, and maintenance should be done in accordance with accepted good practice for the given local conditions known at the time by those responsible for the design, construction, or maintenance of communication or supply lines and equipment.
- 2) Rule 31.2  
Lines shall be inspected frequently and thoroughly for the purpose of ensuring that they are in good condition so as to conform with these rules. Lines temporarily out of service shall be inspected and maintained in such condition as not to create a hazard.
- 3) Rule 18  
Each company (including electric utilities and communications companies) is responsible for taking appropriate corrective action to remedy potential violations of GO 95 and Safety Hazards posed by its facilities.

4) Rule 44.3

Lines or parts thereof shall be replaced or reinforced before safety factors have been reduced (due to factors such as deterioration and/or installation of additional facilities) in Grades "A" and "B" construction to less than two-thirds of the safety factors specified in Rule 44.1 and in Grade "C" construction to less than one-half of the safety factors specified in Rule 44.1. Poles in Grade "C" construction that only support communication lines shall also conform to the requirements of Rule 81.3A. In no case shall the application of this rule be held to permit the use of structures or any member of any structure with a safety factor less than one.

## **XXII. CONCLUSION**

The evidence developed during this investigation clearly established that the reckless actions of PG&E created the risk of a catastrophic fire in the Feather River Canyon, that PG&E knew of that risk and PG&E ignored the risk by not taking any action to mitigate the risk.

The C hook that broke was at least 97 years old. The exact age of the C hook is unknown because PG&E has no record of the hook. Ninety-seven (97) years is assumed because the Caribou-Valona transmission line, of which the Caribou-Palermo line is a segment, went into service in 1921. The records from the Great Western Power Company establish the entire line was built between 1918 and 1921. There are no records of when each tower was built. It is possible Tower 27/222 was built in 1918 and the C hook had been hanging for 100 years as of November 8, 2018. The same is true of the insulator string and the jumper conductor hanging from the C hook.

PG&E also has no records, and no idea, by whom the C hook was made, and more importantly, of what type of metal and how the C hook was made. The type of metal and the process of manufacture are what determines the hardness of metal. The transposition towers were designed to allow for movement of the conductor and insulator. The fact the C hook was constantly rubbing back forth against the hanger hole was known. The concept of body-on-body wear from constant rubbing together of two metals is a long established and well known phenomenon. Also long established and well known is the fact the various hardness of the metals rubbing together plays a key role in the body-on-body wear. The fact that PG&E relied on a 97-100 year old C hook it knew nothing about to hold an energized 115kV conductor is, by itself, negligent and reckless.

It is also disturbing that PG&E's only information of the composition of the conductor running through Tower 27/222 comes from a 1922 article in an engineering journal. A conductor is the wire that carries electricity from Point A to Point B. A conductor is the most important component of the transmission system. Everything else in the transmission system is designed around the conductor. PG&E has owned the Caribou-Palermo line since 1930. Based upon the lack of records PG&E has never made any attempt to inventory and catalogue the conductor. The fact that PG&E was using a 97-100 year old conductor for which they knew almost nothing is evidence of absolute indifference on the part of PG&E.

Perhaps even more disturbing is the fact the conductor was aluminum reinforced with a steel core. 452.3 kcmil Aluminum Conductor Steel Reinforced to be exact. According to the Quanta report the average age of non-copper conductor was 36 years and the “greatest risk of failure in transmission conductors is thought to be with the oldest steel reinforced conductors” Although PG&E knew almost nothing about the conductor they did know it was at least 97 years old and made of steel reinforced aluminum. Despite this knowledge, PG&E did nothing and made no plans to replace that conductor. Even though because of updated NERC guidelines, PG&E was forced to replace conductor on some segments of the Caribou-Big Bend section, they elected to leave in place the 97-year-old aluminum steel reinforced conductor in other areas. The fact that the Senior Director of Transmission Asset Management preached the cost effective value of bundling projects but had no plans through 2022 to replace the 97-year-old aluminum, steel-reinforced conductor speaks volumes. What it says is that PG&E fully intended to run that conductor to failure. A reasonable person doesn’t need an electrical engineer or Quanta Technologies to tell him that failure of an energized 115kV is extremely dangerous. PG&E’s decision to leave the 97-year-old aluminum, steel-reinforced conductor in service was extraordinarily reckless.

In addition to basic engineering principles and common sense, PG&E had actual knowledge that both the C hooks and the hanger holes suffer wear and would eventually break if not replaced. At some unknown point between 1921 and 2018 somebody added the hanger plate brackets to Tower 27/222. Although there are no records of when or why the hanger plate brackets were added the only reasonable conclusion, based upon the wear observed on the original hanger holes, is somebody noticed the wear and was concerned enough to take action.

In 1987 PG&E had absolute knowledge of the wear to both the C hooks and hanger holes. The photographs in the 1987 Laboratory Report document channeling on the C hooks and key holing on the hanger holes similar to what was found on the Caribou-Palermo line. The similarities are not surprising because the transmission line on which the C hooks and hanger holes were found, the Oleum G line, was also part of the original Caribou-Valona line. The fact PG&E chose to only perform tensile strength testing in 1987 and did not subject the hooks and hanger plates to metallurgical analysis tends to show PG&E was not concerned with the wear or the expected useful life of the hooks and holes. Although in 1987 the evidence indicated at least some action was taken based upon the observed wear on the C hooks and hanger holes, when similar wear was found on hanger holes on the Jefferson-Hillsdale transmission line in 2011 the only action taken was the replacement of the hanger plates. According to the email string a PG&E Engineer correctly surmised that this wear was “probably caused by years of rubbing between the c-hook and the plate.” Based upon the reaction, or lack thereof, to the photographs of the wear it appears that the wear was neither a surprise nor was it considered a major issue by PG&E engineers.

In 2018 the discovery of keyhole wear on hanger plates on the par transmission line caused enough concern that the Transmission Line Supervisor sent the plates to the PG&E lab for analysis and evaluation. Unlike in 1987, in 2018 the lab actually did a metallurgical evaluation. A PG&E lab scientist, with a PhD in Material Science and Engineering, used the available data

to opine the keyhole wear was occurring at a rate of .007 inches per year. Based upon the average wear rate, the PG&E lab scientist determined the useful life of those hanger plates to be between 97 and 100 years. PG&E now had scientific confirmation of the body-on-body wear caused by the constant movement of the C hooks within the hanger holes and had an estimate of average wear per year. Nothing was done. The report was not distributed through the company and no targeted inspections of older C hooks and hanger holes were ordered. Based upon this report, a reasonable person, knowing they had C hooks which were 90+ years old hanging in hanger holes that were 90+ years old would have taken immediate action to determine the condition of those hooks and holes. The fact PG&E did nothing is evidence of complete and absolute indifference to the inherent danger of a C hook or hanger hole breaking.

Knowledge of the danger inherent in a C hook or hanger hole breaking is firmly established in PG&E documents. Since at least 2006, PG&E has recognized bad things, especially fire, happen when equipment failures occur on transmission lines. Everything in the overhead electric transmission system is designed to keep the conductor hanging in the air and away from persons or objects it could harm. Despite this knowledge PG&E put almost no effort into ensuring the components that keep the extremely dangerous overhead transmission lines hanging safely in the air were safe. Based upon the assertions of the PG&E personnel assigned to inspect and patrol the Caribou-Palermo line, it was not possible to assess the condition of the C hooks and hanger holes from either the ground or a helicopter flying 30 to 40 miles per hour a couple hundred feet above the line. Although claims it was impossible to assess the condition of the C hooks and hanger holes from a helicopter were completely discredited by BCDA investigators, the results of the post Camp Fire “enhanced” inspections and the Exponent Report clearly establish this was not solely a Caribou-Palermo line or Table Mountain Headquarters problem. This was a systemic PG&E problem.

During the post Camp Fire inspections, worn C hooks and worn hanger holes were found throughout the PG&E Overhead Transmission System. Despite the knowledge C hooks and hanger holes wear over time and despite the knowledge of the danger inherent in the failure of a C hook or hanger hole, the evidence clearly established nobody in PG&E was inspecting C hooks and hanger holes.

Despite the efforts of PG&E personnel to distance the company from the “Run to Failure” model, the evidence clearly establishes quite the opposite. PG&E had knowledge of the potential consequences of failure of the nearly 100-year-old C hooks, yet PG&E continued its policy of “Run to Failure.”

Because nobody was looking at and assessing the C hooks and hanger holes, there were very few, if any, notifications/tags generated for worn C hooks or hanger holes. As a result, the need for replacement of C hooks and hanger holes never came to the attention of Transmission Asset Management. The lack of verified records for many of the older, acquired transmission lines made the problem worse. In large population areas PG&E was staffed by experts, trained and qualified engineers and specialists having decades of experience. In less populated areas, Transmission Line Management was almost completely dependent upon less qualified Troublemens, Linemen and Towermen and other personnel. For approximately ten years the

M&C engineer assigned to the rural northern area was not an actual engineer and had no engineering education, training or background.

Very little effort was made to audit the lack of findings of line personnel. Equipment failure related outages were repaired as they occurred and no effort was made to investigate the root cause of the failure. Transmission Asset Management essentially employed a strategy of either intentional or incompetent ignorance.

In essence, in 1930 PG&E blindly bought a used car. PG&E drove that car until it fell apart. The average reasonable person understands the basic proposition that older equipment needs more attention. A reasonable person doesn't buy a used car blindly and without at least a test drive. A reasonable person doesn't drive that used car for 200,000 miles without, at the very least, changing the oil and rotating the tires. A reasonable person has the common sense to know that service and maintenance become more important as the car ages and the miles accumulate.

This is, in essence what PG&E did. PG&E bought a used transmission line in 1930. PG&E knew next to nothing about the transmission line and made no attempt to learn about the line. PG&E ran the line for 88 years with minimal maintenance and repair. But for the Camp Fire, PG&E would have continued using the line with minimal maintenance and repair. Catastrophic failure of the Caribou-Palermo line was not an "if" question; it was a "when" question.

Although Quanta Technologies is well known and well respected in electrical utilities circles, the conclusions and recommendations of the 2010 Quanta Reports were essentially common sense findings. The basic findings of Quanta were that PG&E's infrastructure was aging and continued use required increased inspections and maintenance. According to the Senior Director of Transmission Asset Management, the Quanta Reports were discredited because of issues with tower failure data. The PG&E criticisms of the Quanta Reports may have been well founded, but the areas criticized have very little relevance to the ultimate conclusion that the transmission assets were old and needed more attention and care. PG&E obviously didn't take issue with the Quanta conclusions about the age of the transmission infrastructure. Transmission Asset Management continued to cite the Quanta age data and conclusions in subsequent internal and regulatory documents for the next seven years.

The evidence established that despite common sense and the Quanta Report, PG&E went the opposite direction. PG&E internal emails and documents established that by 2007 PG&E was aware of the aging electric transmission infrastructure problem. Former employees of the predecessor departments to the current Transmission Asset Management established PG&E was aware of its aging electric transmission infrastructure problem by the early 1990s.

Despite its knowledge that many of its assets were built prior to World War 2 and despite its lack of knowledge of the components of acquired electric transmission lines, PG&E had consistently reduced the frequency and thoroughness of inspections and patrols on those lines. In other, more populated areas, PG&E routinely used the fact that transmission lines were built after World War 2 to justify repair and replacement.

The 2014 RIBA process demonstrated how PG&E manipulated data to achieve desired results. It is beyond reasonable comprehension that a project to replace temporary poles not expected to stand through the winter scored lower for safety than an unnecessary project proposed solely to allow PG&E to transfer money spent from the expense budget to the capital budget. The fact that PG&E minimized and, ultimately, ignored a serious safety issue is reckless and negligent. The fact that they did so in the middle of a historic drought in an area known for consistent, extreme winds, is criminally negligent.

Despite its knowledge that its transmission assets were nearing the end of useful life and deteriorating PG&E decreased the expertise of the persons doing the inspections. This pattern continued after and in spite of the Quanta Reports. This is the exact opposite of how a reasonable person would have been expected to respond. The evidence clearly demonstrated PG&E understood the relationships between age of components and wear, wear and equipment failure and equipment failure and fire, but unlike a reasonable person, devoted less time and qualified personnel to inspecting the oldest assets.

This trend continued even in the face of the devastating effects of climate change. According to data from the US Geological Survey three of the four worst droughts in the recorded history of California have occurred since 2001. PG&E risk analysis reports, both internal and regulatory have consistently identified wildfire as the number one enterprise risk since 2006. The evidence clearly established PG&E was aware of the drought and the danger of catastrophic fire by 2013. Internal PG&E documents established that in 2013 PG&E identified the Feather River Canyon as a high fire danger area. Despite its knowledge of the increasing risk, the evidence established PG&E not only did nothing to mitigate the fire risk in the Feather River Canyon, it ignored known fire dangers for years.

Prior to 2006 PG&E had identified parallel groove connectors as a fire danger. In PG&E's 2006 "Risk Analysis of Urban Wild land Fires", the replacement of the parallel groove connectors is listed as a proposed mitigation. Unfortunately the proposal was only applied to Urban-Wildland Interface areas, which PG&E limited to the Bay Area. In the Feather River Canyon hundreds of known fire threats were left in transmission towers until 2016. Although the parallel groove connectors were ultimately replaced before causing a known fire, the fact those connectors remained in use for ten years, through two historic droughts, shows the complete disregard and indifference to the potential consequences by PG&E.

PG&E electrical transmission policies and records prior to the Camp Fire mirrored PG&E gas transmission policies prior to the San Bruno catastrophe. The investigation of the San Bruno catastrophe established that prior to the explosion, PG&E gas transmission had made very little effort to investigate and catalogue the components of the acquired gas transmission assets. Instead PG&E relied on assumed values. The San Bruno investigation also established PG&E intentionally was using the least expensive method of inspection in the least expensive manner. The chosen inspection method also saved money because problems that are not found do not need to be repaired. The investigation also established records relating to inspections, both justifying methods of inspection and the inspection reports, were fraudulent.

Somehow, the lessons of San Bruno were not learned on the electric transmission side. The evidence established that despite the lessons of San Bruno on the electrical transmission side, since 2010 PG&E has continued to rely on assumed values, the least expensive method of inspection and done nothing to ensure the veracity of inspection reports. The tragedy of San Bruno somehow had no effect on the electric transmission division. The five felonies for which PG&E was convicted changed nothing on the electric transmission side.

The philosopher George Santayana is credited with saying “Those who cannot remember the past are condemned to repeat it.” By ignoring the lessons of San Bruno PG&E condemned itself to another catastrophe. Based upon its own history PG&E knew it was creating a high risk of causing a catastrophic fire but, unlike a reasonable person, chose to ignore that risk.

Because of PG&E’s reckless and negligent decisions to unreasonably ignore risk, 18,804 structures, including almost 14,000 residential structures were destroyed – and 84 Butte County citizens needlessly lost their lives.

### **XXIII. SENTENCING**

The court’s sentencing options are limited. As a corporation PG&E cannot be incarcerated and PG&E has indicated that it will decline probation. The only punishment available to the court is to fine PG&E. The maximum fine for a violation of Penal Code section 192(b) is \$10,000. The maximum fine for a violation of Penal Code section 452 is \$50,000. Based upon the foregoing the People urge the court to impose the maximum possible fines.

#### **A. RESTITUTION**

The People request that the court reserve jurisdiction over restitution and set a hearing in six months to review restitution in light of PG&E’s bankruptcy proceedings. In the wake of the Camp Fire many civil suits were filed against PG&E by the victims of the Camp Fire.

Subsequently PG&E filed for bankruptcy in the Federal Bankruptcy Court in San Francisco. All Camp Fire civil suits and claims have been transferred to the Federal Bankruptcy Court. As of December 31, 2019, it is estimated that over 90% of the eligible Camp Fire victims have filed claims in the Federal Bankruptcy Court. PG&E has entered into a settlement agreement with all claimants in the Federal Bankruptcy Court.

Based upon consultation with bankruptcy experts in the California Attorney General’s Office, the People believe any restitution order issued by this court would be discharged in the bankruptcy proceedings. PG&E filed for bankruptcy under Chapter 11. A Chapter 11 reorganization produces a plan detailing how much various debts will be reduced. (11 U.S.C. § 1123(a)(3).) The plan applies to all debts that “arose before the date” of the confirmation of the plan by the bankruptcy court. (11 U.S.C. § 1141(d)(1)(A).) A debt arises at the time of the “conduct giving rise to the debt.” (4 Collier Bankruptcy Practice Guide (2018) § 76.03A.)

The Supreme Court has ruled that criminal restitution qualifies as a debt for bankruptcy purposes. (See *Pennsylvania Dept. of Public Welfare v. Davenport* (1990) 495 U.S. 552, 564.) Thus, restitution may be reduced or discharged in a Chapter 11 plan unless an exception applies. An exception exists for criminal fines and restitution. (11 U.S.C. § 523(a)(7); *Kelly v. Robinson* (1986) 479 U.S. 36, 53.) But the exception applies only to “individual” debtors. (11

U.S.C. § 1141(d)(2).) And exceptions for individual debtors do not apply to corporate debtors. (See *Garrie v. James L. Gray, Inc.* (5th Cir. 1990) 912 F.2d 808; *In re Spring Valley Farms* (11th Cir. 1989) 863 F.2d 832, 834; *Yamaha Motor Corp. v. Shadco* (8th Cir. 1975) 762 F.2d 668, 670.) As one bankruptcy court put it, “It is almost undebateable and universally held that a corporate Chapter 11 debtor is not subject to the” exceptions that apply to individual Chapter 11 debtors. (*In re Push & Pull Enterprises, Inc.* (N.D.Ind. 1988) 84 B.R. 546, 548 (N.D.Ind. 1988).)

Of the exceptions that apply to corporations, none includes criminal restitution. The closest exception deals with debts owed on money or property obtained by fraud. (11 U.S.C. § 1141(d)(6).) In short, criminal restitution owed by a corporation for a crime committed before the bankruptcy petition is filed is a debt that may be reduced or discharged as part of a Chapter 11 reorganization. The one court to have considered this issue reached the same conclusion. (See *In re Wisconsin Barge Lines, Inc.* (E.D. Mo. 1988) 91 B.R. 65, 67-68.)

Thus, any restitution owed by PG&E to persons harmed by the Camp Fire will be subject to reduction or discharge in a Chapter 11 reorganization. Any restitution order by this court is limited in fact, if not in law, to the final order of the Federal Bankruptcy Court and this court should await the outcome of the pending Bankruptcy proceedings.

## **B. Factors In Aggravation**

California Rule of Court 4.421 defines factors the court may consider in making a sentencing determination. Under Rule 4.421 the court may consider the following relevant factors:

### **(a) Factors relating to the crime**

- (1) The crime involved great violence, great bodily harm, threat of great bodily harm, or other acts disclosing a high degree of cruelty, viciousness, or callousness;**

**PG&E is pleading to 84 felony counts of Involuntary Manslaughter in violation of Penal Code section 192(b) and one count of Unlawfully Causing a Fire in violation of Penal Code section 452. PG&E is also admitting Special Allegations involving Great Bodily Injury to a firefighter and two civilian victims.**

**The facts establish a callous disregard for the safety and property of the citizens of Butte County.**

- (3) The victim was particularly vulnerable;**

**There are almost 50,000 victims of the Camp Fire. All of those people relied upon PG&E to provide safe electric power. Despite years of extreme drought, consistently high down canyon winds and the knowledge equipment failure on high voltage transmission lines can**

cause fires, PG&E ignored warning signs and did the absolute minimum to mitigate the fire danger.

The most vulnerable population were the mobility challenged and the elderly. People like Rafaela Andrade, Andrew Downer, Rose Farrell, Helen Pace, Ethel Riggs and Kimber Wehr had no ability to escape the fire. Those and other lives depended upon PG&E doing its statutory and moral duty.

- (4) The defendant induced others to participate in the commission of the crime or occupied a position of leadership or dominance of other participants in its commission;

PG&E, although an inchoate entity, nonetheless operates only through the actions of its employees. Through a corporate culture of elevating profits over safety by taking shortcuts in the safe delivery of an extremely dangerous product – high-voltage electricity – PG&E certainly lead otherwise good people down an ultimately destructive path.

- (9) The crime involved an attempted or actual taking or damage of great monetary value;

By saving money on needed maintenance, repairs, replacements was able to generate profits in the billions of dollars.

- (11) The defendant took advantage of a position of trust or confidence to commit the offense.

PG&E was entrusted by the People of the State of California to provide safe and reliable electricity. PG&E took advantage of that position of trust and was able to generate billions of dollars in profit.

**(b) Factors relating to the defendant**

- (2) The defendant's prior convictions as an adult or sustained petitions in juvenile delinquency proceedings are numerous or of increasing seriousness;

In 2016 PG&E was convicted of multiple federal felonies as a result of the 2010 explosion of a PG&E gas transmission pipe in the City of San Bruno. The San Bruno explosion killed eight people, destroyed 35 residential structures and damaged many additional residential and commercial structures. The felonies for which PG&E was convicted related to inspection policies, procedures and record keeping. Eight years later, as a result of similar reckless and criminal inspection policies, procedures and record keeping PG&E stands convicted of 84 counts of manslaughter.

(4) The defendant was on probation, mandatory supervision, post release community supervision, or parole when the crime was committed;

**PG&E was on federal probation on November 8, 2018. On January 26, 2017, PG&E was granted five years' probation in United States District Court, Northern District of California case number 0971 3:14CR00175-001 TEH.**

(5) The defendant's prior performance on probation, mandatory supervision, post release community supervision, or parole was unsatisfactory.

**Special condition of probation number 1 states “While on probation, PG&E shall not commit another Federal, State, or local crime.” While on probation, as a result of policies similar to those for which PG&E was convicted, PG&E has continued to cause disasters, including the 2015 Butte Fire, the 2017 Wine Counties Fire, the 2017 Honey Fire, the Camp Fire and, most recently, the Kincaide Fire in 2019.**

### **C. Factors in Mitigation**

a) Factors relating to the crime Factors relating to the crime include that:

(1) The defendant was a passive participant or played a minor role in the crime;

**Not applicable**

(2) The victim was an initiator of, willing participant in, or aggressor or provoker of the incident;

**Not applicable**

(3) The crime was committed because of an unusual circumstance, such as great provocation, that is unlikely to recur;

**Not applicable**

(4) The defendant participated in the crime under circumstances of coercion or duress, or the criminal conduct was partially excusable for some other reason not amounting to a defense;

**Not applicable**

(5) The defendant, with no apparent predisposition to do so, was induced by others to participate in the crime;

**Not applicable**

(6) The defendant exercised caution to avoid harm to persons or damage to property, or the amounts of money or property taken were deliberately small, or no harm was done or threatened against the victim;

**Not applicable**

(7) The defendant believed that he or she had a claim or right to the property taken, or for other reasons mistakenly believed that the conduct was legal;

**Not applicable**

(8) The defendant was motivated by a desire to provide necessities for his or her family or self; and

**Not applicable**

(9) The defendant suffered from repeated or continuous physical, sexual, or psychological abuse inflicted by the victim of the crime, and the victim of the crime, who inflicted the abuse, was the defendant's spouse, intimate cohabitant, or parent of the defendant's child; and the abuse does not amount to a defense.

**Not applicable**

(b) Factors relating to the defendant Factors relating to the defendant include that:

(1) The defendant has no prior record, or has an insignificant record of criminal conduct, considering the recency and frequency of prior crimes;

**Not applicable**

(2) The defendant was suffering from a mental or physical condition that significantly reduced culpability for the crime;

**Not applicable**

(3) The defendant voluntarily acknowledged wrongdoing before arrest or at an early stage of the criminal process;

**PG&E plead guilty as charged to the Indictment at arraignment.**

(4) The defendant is ineligible for probation and but for that ineligibility would have been granted probation;

**Not applicable**

(5) The defendant made restitution to the victim; and

**PG&E has agreed to restitution to victims of the Camp Fire as part of a civil settlement in the Federal Bankruptcy Court.**

(6) The defendant's prior performance on probation, mandatory supervision, postrelease community supervision, or parole was satisfactory.

**Not applicable**

(c) Any other factors statutorily declared to be circumstances in mitigation or which reasonably relate to the defendant or the circumstances under which the crime was committed.

**Not Applicable**

**D. Conclusion**

The factors in aggravation greatly outweigh the factors in mitigation. For this reason the court should impose the greatest sentence allowed under the law – the maximum fines of \$10,000 for each of the 84 counts of manslaughter and the maximum fine of \$50,000 for the count of Unlawfully Causing a fire.